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Vol. 4**

**Pennsylvania. Board of Canal
Commissioners.**

**Report of the Canal
Commissioners, of the
Commonwealth of**



H. Denny's
REPORT

OF THE

Canal Commissioners,

OF THE

COMMONWEALTH OF PENNSYLVANIA,

ACCOMPANIED

WITH DOCUMENTS.

.....
READ in the House of Representatives, January 4, 1828.
.....


HARRISBURG:

PRINTED BY SAMUEL C. STAMBAUGH

1828.

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OFFICE OF THE CANAL COMMISSIONERS.

Harrisburg, December 28th, 1827.

SIR—

I herewith transmit to your excellency, the annual report of the
anal commissioners of Pennsylvania, as required by law.

Very respectfully, sir,
Your ob't. servant,

DAVID SCOTT

*His Excellency.
Governor Shulze.*

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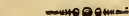
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REPORT

Of the Canal Commissioners of Pennsylvania, to the Legislature.



The Canal Commissioners of Pennsylvania respectfully submit the following report.

The board after preparing their report of the 6th February last, and despatching such incidental business as claimed attention, adjourned to meet again on the first of May, by which time it was believed the legislature would have acted definitively upon the system of improvement proposed by the commissioners. In the meanwhile, the president was directed to open a correspondence with engineers of established reputation, and to make arrangements for securing their services in case they should be required. This duty was so far executed, that at the meeting of the first of May, Judge Geddes, Major Douglass and Mr. Guilford, attended by invitation, and expressed their readiness to serve upon the terms which had been established by the practice of the preceding year. These gentlemen, with Messrs. Strickland and Roberts, would have been able to accomplish a large portion of the business of the season.

But at this stage of their proceedings, the board found themselves embarrassed by the operation of the 2d section of the act of 16th April, 1827, by which it is declared that "from and after the term or time for which any engineer may have heretofore been employed, the salary of such engineer shall not exceed two thousand dollars, that no allowance shall in any case be made for personal or other expenses," and by which further restrictions are imposed upon the engineers and commissioners. The application of this section to the cases presented to the board, involved considerable difficulty, as will appear from a statement of the special circumstances. Mr. Strickland had been employed in March, and Mr. Roberts in April, 1825, at the rate of three thousand dollars a year, together with reasonable expenses, their engagements to continue during

the pleasure of the board. It was unanimously agreed that all allowances to those gentlemen for personal or other expenses, ceased by the terms of the law, at the moment of its passage, and that no pre-existing contract in reference to such expenses could be considered as provided for. A majority of the members present were further of opinion that the original engagement was not for such distinct "term or time" as the act of Assembly contemplated, and that after so strong an expression of legislative opinion unfavorable to its provisions, it was the duty of the board to exercise their power of terminating the contract upon reasonable notice to the other parties concerned. Upon these principles it was determined that the existing arrangements with Mr. Strickland and Mr. Roberts should be considered as expiring on the first of June, that the salary of three thousand dollars without extra allowances of any kind should be continued until then, and that they should be re-appointed engineers from that date, subject to all the provisions of the act of 16th April, 1827.

Before the passage of the act of the 16th April, Messrs. Geddes and Douglass had been invited by the secretary under the direction of the president, to enter the service of the commonwealth, upon the terms of the preceding year, with an understanding however that the consent of the board was necessary to complete the arrangement. Upon these facts, the same majority of the board were now of opinion that such provisional engagements could not be deemed contracts within the meaning of the law, and those gentlemen, together with Mr. Guilford whose invitation was of more recent date, were accordingly appointed engineers, under all the restrictions of the existing law, and without regard to any previous arrangement.

These views and proceedings were immediately announced to the engineers concerned, in letters from the secretary. On the same day answers were received from Messrs. Strickland, Roberts, Geddes and Douglass, declining, and from Mr. Guilford accepting the appointment. Copies of this correspondence are annexed, from which the legislature will perceive the particular motives by which each was governed. It is only necessary here to remark that Mr. Strickland in his answer, proposed occasionally to visit the eastern division and give his advice if desired, and that Mr. Roberts offered to remain on the western division until the middle of July, in order to lay out the new line towards Blairsville, and give all necessary explanations to his successor.

The commissioners thus suddenly deprived of most valuable assistance, could not but entertain a painful sense of the responsibility of their situation, and of the consequences which might arise from any error on their part. They determined nevertheless, after making the most efficient disposition of their present force, to spare no effort to supply the loss, and complete the great objects committed to their care. That the work under contract might not be interrupted, the care of the eastern division was assigned to Mr. Rawle, and that of the western to Mr. Harris, those gentlemen be-

ing already familiar with their respective plans and details. Mr. Guilford was directed to commence the location of a canal from the mouth of Juniata to Northumberland, and Mr. Livermore, a gentleman who came respectably recommended from the Union canal, was appointed to aid Mr. Roberts in preparing the new line to Blairsville, and to take charge of its construction after Mr. Roberts' departure. These few arrangements, while they exhausted the whole power of the board, left a large amount of most important business wholly unattended to. It was evident however, that no remedy could be applied to the evil before the first of June, when the existing board would be dissolved by law. They found it necessary therefore, to adjourn *sine die* after instructing the president to make diligent enquiries for competent engineers, and requesting the governor, to convene the new board of commissioners on the 2d of June.

It is proper to mention, that before this adjournment the Presidency of the board was resigned by Dr. Darlington, and that David Scott, Esq. was elected in his stead.

On the second of June, the Governor of the Commonwealth, having in conformity with law, re-appointed seven members of the former board, and having appointed Jonathan Roberts and James Clarke, Esqr's. in the place of Dr. Darlington and Mr. Dallas, who declined further service, a new board assembled at Harrisburg, and was organized by the re-election of David Scott, Esq. as President and of Joseph M'Ilvaine, Esq. as Secretary. At this meeting, the President made a report of his proceedings, under the resolution of May directing him to enquire for suitable engineers, and it was resolved, that Dewitt Clinton, Jun. James Ferguson, Henry G. Sargent and Charles F. Whippo, of the state of New York; Major John Wilson of South Carolina, and John Randal, Jun. of Pennsylvania, should be employed in that capacity. The charge of the Juniata canal, was assigned to Mr. Clinton; that of the French creek feeder, to Mr. Ferguson, and that of the Delaware line, to Mr. Sargent. To Major Wilson were entrusted the several surveys between the Susquehanna and the Delaware; to Mr. Randal, the survey along the north branch of the Susquehanna, and to Mr. Whippo, the Beaver and Shenango survey, with the understanding, that further duties should be assigned them, if those already specified were finished before the close of the season. In addition to this, Major Douglass was requested to employ the period allowed by the recess of the Military academy, in exploring the route proposed for a connexion between the Conneaut summit and the harbor of Erie. From the great importance and the apprehended difficulty of reaching the bay of Presque Isle, it was peculiarly proper that these examinations should be made by an Engineer with whose qualifications the board were personally acquainted; and who possessed as well their confidence, as that of the people, most immediately interested.

At the same meeting, Mr. Lacock was appointed acting commissioner, for the line extending from Pittsburg to Blairsville, and Mr.

Mowry for the Eastern and Susquehanna divisions. Mr. Clarke, was appointed superintendent of the Juniata division, and Mr. Phillips of the French creek feeder. The two latter having the powers, duties and responsibilities of acting commissioners.

The board having thus explained their general arrangements for the business of the season, will proceed to glance in detail, at its several departments and divisions; giving such particulars in relation to each, as may be conveniently embodied in a single report.

It was stated in the report of last year, that the Western division of the Pennsylvania canal, from the mouth of Kiskiminetas, to within five miles of Pittsburg, had been placed under contract, and was then in a train of rapid execution. The difficulties which had retarded, and which still surrounded the location of the remaining distance, were also detailed, and an opportunity was opened, for the legislature to settle the question, if they thought proper to interfere. At the meeting which took place in February last, a committee appointed by the councils of Pittsburg, made a written proposition to the board, which was in substance "That the canal should be carried across the Allegheny river, by aqueduct and thence through the city, by such route as the commissioners might prefer." That to obviate all objections on the score of damages, the board should name the sum which they were willing to pay for the extinction of private rights and that the corporation of Pittsburg should assume the payment of all damages assessed above that sum. The board having learned that a committee of the legislature to whom this subject had been referred, were discharged from its further consideration, and understanding thereby, that the responsibility of a decision was again thrown upon them, invited a conference with the Pittsburg committees, and with those gentlemen who were interested in the opposite side of the river. After hearing both parties, the proposition of the councils of Pittsburg were acceded to, and two routes specified, upon one of which the canal should pass through the city. The maximum of damages to be paid by the commonwealth upon the first route, was fixed at \$10,000, and upon the other at \$500. It was determined at the same time, to erect an aqueduct across the Allegheny river, as soon as a satisfactory guarantee for the surplus of damages, should be received from the city. That every facility might be afforded, for the execution of this arrangement, the Engineer was instructed to examine at once, all the contemplated routes through the city, and all the points proposed for the site of an aqueduct, and to report their relative practicability and expense at the next meeting. He was also instructed to prepare drafts of the lines through the city, designating the nature and amount of private property, necessarily disturbed, and to furnish copies to the authorities of Pittsburg. These instructions having been executed, to the satisfaction of all parties, a report was received at the meeting in May, and at the same time, a communication from the councils of Pittsburg, declining the guaranty proposed by themselves, upon either of the routes, which the board had specified, but asking that a third route,

passing by a tunnel through Grants hill to the Monongahela at the mouth of Sukes run, might be adopted. In this case, they offered to pledge the faith of the city "that the expense to the commonwealth of making the canal, tunnel and bridges, according to the report of the Engineer, including damages to private property, as well as all other attendant expenses, should not exceed the sum estimated by the Engineer, as the cost of the Liberty street and Penn street route, with the addition of the \$10,000, for damages to private property, allowed by the board in their resolution of February. To this proposition, a majority of the members present, were prepared to consent, and a resolution was accordingly passed, by which the location of the western division was continued from Pine creek, down the west side of the Allegheny, to a point opposite Washington street, thence by aqueduct across the river, and thence by a tunnel through Grants hill, to the Monongahela. It was determined at the same time, to connect the canal with the Allegheny on the west side, by means of locks and other necessary works, so that an outlet might be secured at all times, independently of accident to the aqueduct.

The proper authorities of Pittsburg, having executed the guarantee required by the board, this additional line was let out to contractors on the 21st of June, on very favourable terms. The canal on the west side, from Pine creek to its junction with the Allegheny, is estimated to cost \$129,604. The aqueduct has been contracted for at \$100,000, and the remaining distance to the Monongahela, including tunnels and locks, at \$61,000, making in all \$290,604. Of this aggregate, \$67,882 have already been paid, so that \$222,722, will be required to complete the line. The whole amount of work done, is estimated at \$77,373, the sum of \$9,491 being retained as security for the completion of the contracts.

The construction of an aqueduct across the Allegheny at the mouth of Kiskeminetas, and of the canal from thence to Pine creek, has been vigorously prosecuted since the last report of the commissioners. The amount of work already performed on this portion, is \$ 334,795, and of the actual payments \$ 305,447. Its whole cost will be \$ 396,220, of which \$ 90,733 remains to be expended. Immediately after the adjournment of the board in May, Mr. Roberts proceeded to prepare for contract the new canal from the mouth of Kiskeminetas to Blairsville. After locating a line of about twenty miles, which was let to contractors on the 20th of June, he retired from the service, and was succeeded by Mr. Livermore. The remaining distance to Blairsville, was placed under contract on the 20th of October, making the whole line above the mouth of Kiskeminetas about 51 miles. The whole cost of this division, at the prices agreed upon, will be \$ 552,789, which is less by \$20,000 than the estimate of last year. The whole amount of work already done is \$ 122,723 and of actual payment's \$ 113,290, leaving \$ 439,499 yet to be expended,

Great exertions were made by the acting commissioner and engineer, to complete the fifty miles, from the outlet locks, opposite Pittsburg, to the saltworks on the Kiskeminetas, in time for navigation, the ensuing spring. But the quantity of rain, and the constant high state of the water during the fall, have frustrated their hopes. It is believed, however, that this object will be accomplished early in the summer, and that the whole distance to Blairsville, may be navigable by the first of November.

The preparation of the French creek feeder, was commenced by Mr. Ferguson, as soon as practicable, after his appointment. The law of last session, having restricted the commissioners to such parts of that work, as are common to all the projected routes, between the Ohio and Lake Erie, only nine miles, beginning at Bemis's mill, on French creek, and passing down that stream to the Conneaut outlet, could be put under contract. This was done on the 15th of August, and since then, the work has been industriously prosecuted. The whole cost of the portion commenced, at contract prices, will be \$ 80,758, which exceeds the estimate of Major Douglass, for the same distance, about \$ 1000. The money already expended is \$ 11,900, so that \$ 68,858 will be required for its completion.

In the latter end of May, the location of a line from the mouth of Juniata to Northumberland, was commenced by Mr. Guilford. He was instructed to examine both sides of the Susquehanna with the utmost care, to present an estimate of each; and further to ascertain, whether the river might be advantageously crossed at any intermediate point, so as to place the canal partly on one side and partly on the other. At the meeting of the board, on the second of July, a report was received from Mr. Guilford, accompanied by an estimate, from which it appeared, that a canal on the east side would amount to \$ 1,018,758, and on the west side to \$ 472,298. Strong representations were at the same time made from Dauphin and Northumberland counties, in favor of the east side, to all which the utmost respect was paid. But the vast difference of expense, was thought by the board to leave them no choice, and a location was adopted, beginning at Duncan's Island, and extending up the west side to a point opposite Northumberland.

The expense of this line, at rates established by the actual contracts, will be \$ 441,550, or \$ 80,948 less than the first estimate of Mr. Guilford. In this aggregate is included about \$ 80,000 for the erection of a dam at the Shamokin ripples, which will unquestionably become a source of profit, and which responsible persons have offered to construct without charge, if the water power created, can be placed at their disposal. Deducting a moderate estimate for the value of this work, the final cost of the canal will not exceed \$ 400,000 for 37 miles, or \$ 10,800 per mile. The amount of work performed is \$ 44,384, of which \$ 26,109 have been actually paid. A further expenditure of \$ 415,240 will accomplish its completion by the first of December next.

In the 2d section of the act of 9th April, 1827, it is declared, "that before the commissioners shall determine on the location of the canal, from the mouth of the Juniata river to Lewistown, they shall cause further examinations to be made on each side of the Juniata, by at least two of the most experienced engineers in the service of the state, to determine which side of the river is most favorable and practicable."

In compliance with this act, Mr. Guilford was directed to join Mr. Clinton in the necessary examinations and in reporting on the subject. At the meeting of the board on the second of July, those gentlemen agreed in recommending that from Lewistown to North's Island the canal should occupy the North Bank of the river, that at the last mentioned point it should cross by a dam, and thence continuing on the southern bank, should end for the present, opposite the head of Duncan's lower Island.

They requested also, that further time might be allowed them to consider the place and mode of uniting the Susquehanna and Juniata divisions and the place and mode of crossing the Susquehanna river in order to join the eastern division. This report having met the approbation of the board, a partial location of the Juniata line was made on the same day, leaving a small portion at the lower end, for future determination. The line thus fixed, was placed under contract as soon as possible, and has since been prosecuted with as much vigour as the unfavorable character of the season, and an unusual degree of sickness prevailing among the workmen would permit.

The distance from the head of Duncan's Island to Lewistown is 44½ miles, embracing an unusual proportion of difficult and unfavorable ground.

Its whole cost will amount to \$597,775, of which \$22,262, have been paid, leaving \$575,513, yet to be expended. The value of work executed by the last return was \$26,716. It is expected that a canal from the mouth of Juniata to Lewistown will be ready for navigation in the spring of 1829.

The question as to the place of uniting the two last mentioned canals, and the place and mode of crossing the Susquehanna river are next to be considered. On the second of August a joint report was made by Messrs. Guilford and Clinton, which satisfied the board, that the point of Duncan's Island would be the most advantageous and economical place for crossing the river either by aqueduct or dam, and a majority of their whole number decided accordingly.

At the present session it has been determined by a vote of the whole board, to erect at that place a towing path and turnpike bridge, by the help of which the trade of the Susquehanna and Juniata canals, will pass into the eastern division, through the pool of the dam now forming in the river. The Susquehanna division has been extended accordingly, and it is contemplated that the Juniata canal shall join it somewhere on Duncan's Island.

By the report of last year, it appeared that the eastern division from the mouth of Juniata to that of Swatara had been put under contract. Since then the work has been constantly prosecuted and a great portion of the sections completed. The amount of work done on this division since its commencement, is \$ 335,894, of payments made \$ 319,412, and the further payments necessary for its completion, are estimated at \$ 142,844, applicable chiefly to the sections at the upper end. The board had hoped that this division would be prepared for public use by the ensuing spring, but they have met with disappointment arising from causes beyond their control. It will be remembered that the original report of Mr. Strickland, proposed a dam for the purpose of feeding the line and of crossing the Susquehanna to be located at Duncan's Island, and that for reasons stated by the board last year, this dam was not adopted, and the head of the canal was fixed at Foster's falls, considerably below. Upon this altered plan the eastern division was originally let to contractors. In the month of February last, the necessity of a dam having become obvious, the board upon the recommendation of all their engineers, decided to erect one at Foster's falls. They fixed upon that spot as the head of the canal, they were then authorised to construct, and as the utmost distance they could safely go, while the proper place of crossing the Susquehanna, was not within their competency to decide. It is understood to have been the calculation of the Engineers who recommended this dam, that four feet in height would ensure a supply for the eastern division, and furnish a convenient crossing at Clark's lower ferry, but that if Duncan's Island should be the place of crossing, an additional height must be given, to raise the water sufficiently for the passage of boats. Upon the resolution of the board just referred to, the acting commissioner entered into a contract for the erection of a dam at Foster's falls.

From this time up to the session of the 2d of August, it was wholly uncertain which place of crossing would finally be chosen, and how far such decision might affect the location, or value of the dam. Nor was it practicable for the board under the forms and restrictions provided by law, and with the aid of engineers whose attention had but recently been directed to the subject, sooner to arrive at a safe conclusion. On the day last mentioned, the engineers of the Juniata and Susquehanna divisions having satisfied their own minds, and the board having adopted the upper place of crossing, it was perceived that a dam at Foster's falls would be attended with serious disadvantages. The choice of Duncan's Island for passing the river required an extension of the eastern division to that place, and it appeared satisfactorily that the sum already expended on the lower dam, would be more than saved by a corresponding change in its location.

A resolution providing for this alteration having been laid before the Governor according to law, he was urged by individuals who thought themselves aggrieved, to suspend his consent until their objections could be heard. The governor respecting the source

from which the application proceeded, and anxious to prevent the consequences of error, withheld his permission to proceed with the work, and after hearing the complainants referred the whole subject to the canal commissioners for reconsideration. It was not until the 10th of September, that the board could be assembled for this purpose, when they unanimously adhered to their former resolution. Immediately thereafter the sanction of the Governor was regularly given and the dam, and extended line were placed under contract.

From the delay thus produced, it has not been practicable to complete the two upper sections, in time for navigation the coming spring. The failure of a contractor on the arduous section at Kittatinny mountain, caused a cessation of that work for a considerable period. In such circumstances it could by no effort have been completed the present season. On other sections the state of forwardness would have been greater, but for the certainty that all could not be finished. It is nevertheless calculated, that from Fishing creek to the mouth of the Swatara, the water will be admitted, and that a junction will be formed with the Union canal before the adjournment of the legislature.

The survey of a canal line along the Delaware from Easton to Bristol, was commenced by Mr. Sargent, about the 9th of July, and by great exertions on his part, a report and estimate were prepared on the 20th of August, when a meeting of the commissioners was to take place in Bristol. In consequence, however, of the illness of a member whose presence was expected, a quorum could not be formed, and the subject was necessarily postponed, until the 12th September. Meanwhile the engineer was directed to continue his survey from Bristol to Philadelphia. On the 12th September, the board having assembled at Philadelphia, it appeared by the report of their engineer, that the cost of a canal from Easton to Bristol, with five feet depth of water, and a distance of 60 miles, would amount to \$686,596, or \$11,443 per mile. The same report shewed that a canal might be continued from Bristol to Philadelphia, a distance of $17\frac{1}{2}$ miles, for \$201,799, or \$11,474 per mile. Upon these estimates it became the duty of the board, to make contracts on some portion of the line not exceeding in amount \$100,000. The lower end being recommended for this purpose by strong considerations of convenience and economy, it was also necessary, to fix a point of communication with the tide water of the Delaware. After full reflection upon the subject, they were unanimously of opinion, that to terminate for the present at Bristol, keeping such a level as to allow a future extension to Philadelphia, was preferable to any other plan proposed. They therefore located a line of eighteen miles, commencing at Bristol, and extending upwards, and directed Mr. Kennedy, whom they then appointed superintendant of the division, to advertise its excavation immediately for contracts.

On the 13th of October, contracts for excavating the whole distance were made, at a rate somewhat below the estimate of the en-

gineer, and since then nearly all the sections have been actually commenced. The engagements thus made are estimated by the engineer to amount to \$71,922, and do not include the building of locks, bridges or culverts, all of which have been postponed to another season. No payments were made on account of work till the last week, too late to be included in the superintendant's report, and not of sufficient magnitude to be noticed here. For all practical purposes, it may be assumed, that the sum above stated will be required to fulfil the existing contracts on the Delaware line.

To one or two remarks connected with this subject, the attention of the legislature is particularly invited. In the act of assembly which authorises the commencement of a canal on the Delaware, a proviso is contained, "that the existing natural navigation of the river shall not be obstructed or injured by the construction of the canal." What particular class of works in the Delaware are forbidden by this clause, and what would amount to obstruction or injury within its meaning, would perhaps be a question of considerable difficulty. To avoid touching upon doubtful ground, and to keep from collusion with the state of New Jersey, the board have proceeded on the idea that the whole line of canal shall be supplied from the Lehigh, there being no intermediate tributary of the Delaware, whose aid could be depended upon in the summer season. That the quantity afforded by the Lehigh is abundant for the purpose, and that the use of its water will not so lessen the volume of the Delaware as sensibly to injure its natural navigation, is confidently believed. It is nevertheless true, that to supply such a distance from a single feeder at the upper end, is a serious inconvenience, which a resort to the Delaware, at some middle point, would entirely obviate, and that a great saving might be effected in the neighborhood of Easton, accompanied by considerable advantage to that flourishing town, by drawing the original supply from the Delaware also. From these facts, the observations about to be made, will derive additional importance. The intention of this commonwealth to construct a canal along the valley of the Delaware, has attracted the more notice among the people of New Jersey, from their recollection of the course pursued by the legislatures of the two states, in reference to the Delaware and Raritan canal, by which the principle was understood to be recognised, that neither state had a right to use the waters of the Delaware, without the consent of the other. The citizens of New Jersey, regarded our late act of assembly as a departure from that principle, and were not aware of the distinction between appropriating the water of a tributary stream, whose course is wholly within the limits of Pennsylvania, and drawing more directly from the common highway. The existence of such opinions to a considerable extent, having early come to the knowledge of the board, they conceived it to be their duty, by proper explanations, to remove all cause of excitement or alarm.

In this spirit of conciliation and friendship, they embraced the first opportunity of an interview with some gentlemen of New Jersey, who were urging the construction of the Delaware and Raritan canal, at the expense of that state;—meeting as they had anticipated with a corresponding feeling, they had no difficulty in removing those erroneous impressions as to the motives of Pennsylvania, which had previously existed, and they became convinced that the two states might advantageously agree for the mutual use of the Delaware, upon a basis at once equal and just.

The indications of public opinion in New Jersey, have produced a very general belief, that the construction of the Delaware and Raritan canal at the expense of the state, cannot long be delayed. It is thought not improbable that the approaching session of their legislature may produce a law for its immediate commencement. Of the capacity of the Delaware to furnish water for both canals, without injury to its natural navigation, the board have no doubt. That it is the policy of the two states, to cultivate the most harmonious feelings, and to extend the facilities of mutual intercourse, is equally certain. The propriety of authorising this board, under proper restrictions, to enter into an arrangement with New Jersey for the use of the Delaware, is therefore most respectfully submitted to the wisdom of the legislature. The particulars of the plan most advisable to be adopted, need not now be specified. It should be based on the principle of equal rights and concurrent jurisdiction, and its details so adjusted, that the separate interests and exclusive sovereignty of both may be preserved from violation. It is believed that the state of New Jersey would cordially meet us on this equitable footing, and that thus a series of acrimonious and unprofitable contention, limited only by the period when the waters of the Delaware shall cease to flow, may be happily prevented.

By the first section of the act of 9th April, 1827, the canal commissioners are required to make further examinations in order to determine the practicability of a continued water communication between the West branch of Susquehanna and the Allegheny river. In compliance with this section, and with the request of a number of members of the legislature who felt an interest in the subject, Messrs. William Wilson and John Mitchell, were appointed at the meeting in May, with instructions to examine all points on the dividing ridge not previously explored, and to report whether any and which afforded, in their opinion, a prospect of success. Mr. Wilson to whom the most northern section of country was assigned commenced operations about the first of July, and after following the dividing ridge from the New York line, to a summit between the head of Bennetts branch and that of Sandy Lick, reported this summit, as the only one within his district worthy of attention.—Mr. Mitchell commenced his survey on the 26th of July, and directed his attention to the southern portion of the dividing ridge.—By a letter dated the 20th September, he informed the superintendant of surveys, that a summit between the head of the West branch and that of Two Lick, presented the most reasonable hope

of a water communication, and requested that a professional engineer might be sent to examine and report upon the subject. Upon the receipt of this letter, Mr. Whippo, in whose qualifications for the service, the board have entire confidence, and who was then engaged in the neighborhood of Lake Erie, was directed to repair as soon as possible to Bellefonte, and thence with Messrs. Wilson and Mitchell, to proceed to the points which they had designated. This order was executed as early as practicable, and a report has been received from Mr. Whippo, of which a copy is annexed. It appears, that the whole supply on the Sandy Lick summit, for 14 miles is equal to $8 \frac{88}{100}$ cubic feet per second, while the necessary demand for filtration and evaporation in that distance, would be 12 cubic feet per second, and that a reservoir proposed by Mr. Wilson, for collecting the drainage of the country, in aid of the feeding streams, would be wholly insufficient for the purpose. In regard to the Two Lick summit, its distance is so great from the points of supply, that Mr. Mitchell announces the entire impossibility of furnishing it with water, unless some mode can be devised which will obviate the loss by filtration and evaporation. With this view he proposes the introduction of iron pipes, as a means of conducting water to the summit. In the report of Mr. Whippo, it is demonstrated, that the expense of such an experiment cannot be less than four millions of dollars. Against its adoption at such an enormous cost, two considerations are believed to be conclusive. First—that supposing the whole supply introduced upon the summit, it would barely be sufficient for the passage of 23 boats in a day, or less than one to the hour; and second, that if by the failure of the streams relied upon, which from experience and analogy there is every reason to expect the quantity should be moderately reduced, none would remain for the use of locks. The board are therefore compelled to say, in the most explicit manner, that a navigable communication between the eastern and western waters of Pennsylvania, sufficiently permanent to justify the expense, is wholly impracticable.

The survey of Mr. Randel along the north branch of the Susquehanna, was commenced in the month of July. He began his line of levels at the New York line, and carried it simultaneously on both sides of the river until he arrived at Northumberland, a distance of 161 miles. He has since furnished the board with an estimate of the cost of each mile on either side; and also, of the expense of a complete line formed in the manner most consistent with economy, by crossing the river at several points so as to avoid serious obstacles, and take advantage of more favorable ground. The whole distance located in this way, will amount to \$1,820,587 $\frac{78}{100}$ or \$11,308 per mile. From Northumberland to the Wyoming valley, keeping on the west side all the way, the cost for 56 miles will not exceed \$8,500 per mile. The board have not found themselves materially deceived in the calculations which they presented to the legislature in their last report, and further reflection and information, have con-

firmed their impression of the importance of this communication as a part of the system of improvement.

The surveys directed by law between the Susquehanna and Delaware, were commenced by major Wilson, in the latter end of June. He began his examinations on the Schuylkill, and continued thence through the valley of Chester county, to the gap of Mine ridge, which divides the waters intended to be connected. Having established this summit, the height of which corresponded in a remarkable degree with the report of the first canal commissioners, he proceeded to ascertain the quantity of water which could be brought for its supply. The result of these inquiries, which are believed to have been conducted with great fidelity, rendered the impracticability of a navigable communication so completely manifest, that the survey was abandoned. In conformity with his instructions, major Wilson next proceeded to the mouth of Swatara and commenced the location of a railway line, thence to Philadelphia, a duty which was finally accomplished by the 29th of November. It was the misfortune of this party to be visited with sickness of such extreme severity, that for several weeks but a single individual was fit for duty. In consequence of delay thus produced, a regular estimate of the cost of a railway is not yet prepared. Since his return to Philadelphia, major Wilson has labored with the utmost assiduity, and has furnished the board with a full report of his canal examinations through the Chester valley, with an estimate for a canal along the Susquehanna, from the mouth of Swatara to Columbia, and with a minute and most satisfactory description of the railway line from Columbia to Philadelphia. This line reaches the northern boundary of the city of Lancaster, in a distance scarcely exceeding that of the turnpike road, thence crossing the Conestoga, Pequea, and some smaller streams, arrives at its greatest elevation at the Gap, thence descending into the Chester valley on the north side, and crossing the branches of Brandywine, it reaches the valley summit, and passes to the south side at the White Horse, thence across the country to a point on the Lancaster road about a mile from Philadelphia. Whether the railway shall cross the Schuylkill, and what location should be selected for a bridge, will be questions for mature consideration, and the present termination of the line will correspond with any future decision.

The estimate of a canal from the mouth of the Swatara to Columbia, furnished by major Wilson, is \$192,000. It is his opinion, although a proper estimate is not yet completed, that \$1,000,000 will cover all the expenses of a railway from Philadelphia to Columbia; and the same line may be extended (if thought advisable) to the mouth of Swatara, for \$100,000 more. For the purpose of this report, these sums may be deemed sufficiently accurate; and as the legislature will be furnished with a regular estimate long before a law can pass on the subject, the necessary corrections can easily be applied. The commissioners would not hesitate in choosing between the plans suggested by the foregoing facts. They believe, that a continuance of the Pennsylvania ca-

as far as Columbia, and a communication thence by railway to Philadelphia is decidedly preferable. Regarding this railway as an important feature in the system of improvement, they have been gratified to find, that from the bank of the Susquehanna, (for surmounting which a stationary engine will be required) the limit of graduation for locomotive machinery, may be preserved the whole distance to the city of Philadelphia.

A survey along the Delaware from Carpenters point to Easton, was commenced by Mr. Sargent on the 17th of September, and finished about the first of the present month. He estimates the expense of the proposed canal, at \$1,430,699 for a distance of 70 miles; or, \$20,438 per mile.

The surveys of the past season with a view to connect the Ohio with Lake Erie, are next to be considered. The arrangements, with reference to this subject, were governed by a wish that every possible route might be explored, and all the materials collected for a final decision. Surveys from the Conneaut summit, and from Meadville, by way of French creek to the harbor of Erie, from the mouth of French creek to the Conneaut outlet, and from Pittsburg by the Beaver and Shenango to the Conneaut lake, were consequently provided for. The first has been completely executed, by Major Douglass; the second and fourth, by Mr. Whippo; and the third, by Mr. Ferguson. These lines, in connection with the French creek feeder, as located last year, and with the survey of Judge Geddes, from the mouth of Kiskeminetas to that of French creek, embrace all the modes of communication to which the attention of the board has ever been directed. The expense of a route from Pittsburg by the Beaver and Shenango to the Conneaut summit, is estimated by Mr. Whippo. at \$1,003,401; and if slack water be used for about eight miles along the Beaver, as he recommends, it will reduce the cost to \$928,301 for 120 miles; or, an average of \$8000 per mile. The proposed canal from the head of the French creek feeder by way of Waterford to Lake Erie, is estimated by the same gentleman, at \$416,016, for a distance of 46 miles, with 7 miles of feeder; or somewhat less than \$8000 dollars per mile. From the mouth of French creek to the Conneaut outlet, a distance of 19 4-5 miles, a canal may be constructed, according to Mr. Ferguson, for \$178,000, or \$9,000 per mile. From the Conneaut summit by way of Elk creek to the harbor of Erie, is estimated by Major Douglass, supposing expensive stone locks to be used, at \$835,320 for 47 1/2 miles; or \$17,620 per mile. With wooden locks, it would amount to \$565,894; or \$11,000 per mile. Combining these results with those ascertained by the surveys of the last year, we obtain the following statement, which has been carefully prepared, that the relative merits of all the routes, from the Ohio to Lake Erie, may be perceived at a single view.

	<i>Distance.</i>	<i>Lockage.</i>	<i>Cost.</i>
1. From the mouth of Kiskiminetas by the Allegheny, French creek and Waterford, to Erie harbor.	162 ms.	1103 ft.	\$2,339,427
2. From the same point, by the Allegheny, French creek, Conneaut summit and Elk creek to Erie harbor.	166 ms.	837 ft.	\$2,664,373
3. From Pittsburg, by the Beaver and Shenango, Conneaut summit and Elk creek, to Erie harbor.	167½ ms.	852½ ft.	\$1,730,015
4. From Pittsburg by Beaver and Shenango, Conneaut lake, French creek and Waterford, to Erie harbor.	186 ms.	1118 ft.	\$1,576,131

As this table has been framed for the purpose of an accurate comparison, and as the cost of lockage has been variously estimated by the several engineers according to their preference for wood or stone, this item has been reduced in each instance, to the lowest price fixed by either, which is \$150 per foot. So much of the French creek feeder, as would become a part of the main canal, has been added to the distances respectively, and its whole cost is included in the aggregate of the 2d and 3d routes.

After maturely weighing all the circumstances which are worthy of attention, the board are unanimous in expressing their belief, that the communication between the Ohio and Lake Erie, should begin at Pittsburg, and pass thence by the Beaver and Shenango to the neighborhood of Conneaut Lake. Thus far the choice is indicated by considerations of economy, which cannot be overlooked.— Whether the line shall then continue across the Conneaut summit and by Elk creek to Presque Isle or shall reach the same point by way of French creek, and the Waterford summit, becomes next a question. The distance by the former is 47½ miles and by the latter 66 miles. The difference of expense is not very material; but the excess of lockage on the Waterford route, amounting to nearly 300 feet, is a decided disadvantage. When the additional fact is remembered, that according to the reports, both of Mr. Whippo and of major Douglass, the quantity of water to be obtained on the Waterford summit, though it would probably answer at this time, for the purposes of navigation, is yet a bare supply, which a future diminution of the streams might render insufficient, the inclination of the board is decidedly in favor of crossing the summit near the Conneaut lake. The most serious objection ever urged against it, namely, the apprehended difficulty of crossing the valleys of Elk and Walnut creek, is satisfactorily removed by the report of major Douglass, to which the board with much pleasure refer, as exhibiting unusual care, in the investigation of his subject, and a perfect acquaintance with all its details.

In pursuance of the 13th section of the act of 9th April last, the board, during their session in Philadelphia, devoted a day to the examination of the proposed canal route commencing on the Schuylkill, near the United States arsenal, and terminating below the navy yard, in the district of Southwark; since then they have caused a survey to be made under the direction of Mr. Sargent, whose estimate is hereto annexed. Two modes are proposed for effecting the improvement. If a thorough cut be adopted, the expense will amount to \$376,535. If the summit be reduced to 20 feet, and steam power be used for raising water from the Schuylkill, the work may be accomplished for \$108,000, the distance being a little less than three miles.

It is difficult at this time, to answer the question proposed by law, whether this improvement will constitute a necessary link between the Delaware and the western waters. The exigencies of a great western trade brought to Philadelphia by water, are as yet, matters of mere conjecture. How far the Schuylkill front of the city, may become the seat of business, and how far the cheapness of property there, may counteract the advantages which the Delaware holds out to foreign commerce, are questions which can be answered only by experience. It is not improbable however, that difficulties in navigating the Schuylkill, may render the communication very important to that portion of the western trade, whose ultimate destination is beyond Philadelphia, and this view of the subject would derive additional weight from the construction of a canal between the Delaware and Raritan. The commissioners are therefore of opinion, that the probable expediency of the work ought not to be lost sight of. Whether it shall be undertaken now, or at what future period, is a question they are not prepared to decide, and which indeed belongs more properly to the legislature.

Among the documents annexed hereto, will be found the copy of a report made by judge Geddes, to the canal commissioners of Maryland, in the year 1823, with his estimate of the cost of a canal on the west side of the Susquehanna from the Conewago falls to the Maryland line, and an extract from the report of these commissioners to the legislature. The report of major Wilson already referred to, exhibits the expense on the east side, from the mouth of Swatara to Columbia. The remaining distance to the Maryland line on the east side, has been surveyed by Mr. Whippo, whose report is also annexed. By these documents it appears, that a canal on the west side from the mouth of Swatara to the Maryland line, will amount to \$1,660,000, for 61 miles: and that its execution must be attended with most formidable difficulties. The cost of a canal between the same points on the east side, (if it be practicable at all to effect the communication) will not fall short of \$1,245,408 of which the distance below Columbia will require \$1,053,408.—When however, the character of the river below Columbia, and the ruggedness of its banks are considered, it may seriously be doubted whether a safe and permanent work be practicable within any limit of expense not altogether extravagant.

The original plan of the board, for the business of the season, embraced the surveys directed by law, through Franklin and Cumberland counties; and also, examinations between the Delaware and North Branch, by the heads of Broadhead's creek and of the Lehigh. The first would have been executed by Mr. Whippo, but for his necessary, though unexpected detention, in the neighborhood of lake Erie. The other two were defeated by the sickness of the party employed upon the Delaware, who would otherwise have been able to finish them in season. In reference to the examination directed to be made between the Brandywine and Chester creek, it is sufficient now to remark, that it was rendered wholly unnecessary by the facts which major Wilson ascertained, while employed in that vicinity.

It is seriously regretted, that an accurate location of the portage line across the Allegheny mountain, has not been practicable during the present season, without the sacrifice of objects more immediately pressing. This important subject will receive attention early in the spring. It is believed, that an advantageous change in the plan proposed last year, will shorten the distance to about thirty miles.

The engineers engaged upon the several surveys, have not been able to complete their drafts, in time to be transmitted with this report. Those of Messrs. Wilson and Mitchell, exhibiting the summits, which they respectively surveyed, will be found among the papers annexed hereto.

Before taking leave of the surveys, it is proper to mention, that the whole sum appropriated to those objects, has been drawn from the treasury. As the accounts of the season are not yet closed, and a portion of the engineers have not been paid, it is impossible to say, what balance will remain for the service of another year. The amount however, cannot be sufficient for any important operations.

Having thus hastily glanced at the several subjects committed to their care, the board must refer for additional particulars, to the voluminous documents hereto annexed. They will be found to contain all that is necessary for the general information of the Executive and the Legislature, as well as the several statements which are specifically required by act of Assembly.

With all these facts and documents before them, the board have perceived no reason to change their opinions, as expressed in the report of 6th of February last. The system of improvement then proposed to the legislature, was based upon the belief, that besides the establishment of a great western communication with the Ohio and Lake Erie, it was the interest of the commonwealth, as far as possible, to develop its natural resources, and give encouragement to its industry and enterprise. Hence, they recommended, that the great avenues of trade should all be improved, and that each should be placed in the closest practicable connexion with the commercial emporiums. When that report was made, the commissioners, for want of more accurate information upon some of

the lines which constitute the system, were unable to propose them for immediate adoption. This want is now fully supplied, and the board are relieved from all embarrassments on the subject, by the annexed reports of surveys, performed between the Ohio and Lake Erie, from the mouth of Swatara to Columbia, and along the valley of the Delaware. The results are of a nature so satisfactory, and so consistent with the expectations previously formed, that every suggestion of last year, as to the nature, objects and extent of the Pennsylvania system of internal improvement, is now confidently expected.

If the legislature shall again coincide with the views of the board, it is respectfully asked, that the outline of the plan which must govern their proceedings, may be distinctly marked. The uncertainty which has heretofore prevailed, as to the further extension of the several lines, has caused much inconvenience. To this source may be traced nearly all their difficulties about crossing the Susquehanna; and similar embarrassments are anticipated on the North and west Branches, unless the board can be informed to what extent those improvements will certainly be carried, and may feel themselves at liberty to fix the location of a part with reference to the whole.

The board, in pursuance of their opinion, expressed last year, would be disposed without special directions from the legislature, to advance the several works which constitute the system, in a fair and reasonable proportion, urging each forward with the utmost rapidity, consistent with the public good, and with the faithful execution of the work. To accomplish this purpose, if its expediency shall be sustained by the legislature, a further appropriation of \$2,000,000, will be abundantly sufficient for the next season.

One or two additional remarks, will close a report, already swelled beyond the usual limit.

It is believed that the organization of the engineer department, upon a regular and well digested system, is necessary to insure economy of expenditure, and excellence of construction. This object has not yet been accomplished, nor is it believed to be practicable, while the provisions of the act of 16th of April, 1827, continue in force.

In every instance where an attempt has been made to engage an engineer, the terms of that law, have proved a serious obstacle, and in no instance have the board succeeded, without giving an assurance, that the necessity of a change should be urged upon the legislature. If no alteration should take place at the present session, they cannot answer for the continuance of a single individual, whose services are valuable. It is, therefore, most respectfully asked, that the commissioners, upon their responsibility to the legislature and to the public, may be permitted to organize this department upon a footing at once permanent, efficient and economical.

One feature in the act of 16th April, 1827, the board in justice to a portion of their engineers, are bound to notice. In that law,

while \$2000 a year is fixed as the maximum for engineers permanently engaged, those who may be employed for shorter periods, are limited to \$4 a day, which is only at the rate of \$1460 a year. If any difference were made, it should operate in favour of those individuals, whose expenses are heaviest and hardships greater, and whose engagements being temporary in its nature, is intrinsically less valuable. They are at least entitled to equal reward.

The distinction thus created by law, has operated with great hardship upon those who have travelled long distances in the execution of their duties, and whose season of arduous and incessant labor has been almost unproductive. As the board and the public have great reason to be satisfied with the zeal and ability manifested by these gentlemen, their case is earnestly recommended to the consideration of the legislature. A provision allowing them to receive from the treasury so much in addition to the \$4 a day, as will place them at the rate of \$2000 a year for the days they have served, would be gratifying to the board and satisfactory to them.

The extension of the surveys, and the increased magnitude and importance of the duty arising from it during the past season, obliged the board to consider seriously of some efficient plan for organizing this branch of their business. It seemed to them indispensable, for this purpose, that there should be an officer of known ability and competent knowledge, in all respects worthy of the confidence of the board to whom the general superintendence should be entrusted. The third section of the act of 16th of April last, gave them the requisite authority, and they found in their secretary all the qualifications for the performance of this interesting duty. Their expectations have not been disappointed. The service has been faithfully and ably rendered in a manner to contribute equally to the convenience of the board and the advantage of the public. In speaking of this meritorious officer, the board deem it but common justice to bear their testimony to his unwearied devotion to the great objects committed to his care. His proper duties merely as secretary, are of a limited nature, and if he had been so disposed he might with perfect justice have confined his labors within those limits. The compensation allowed him by the board would not have been more than sufficient even for such a construction.— But regarding more the public interests than his own, he has willingly employed his time and his talents wherever they could be useful, and has at all times rendered an amount of service of which his office of secretary would give but an imperfect idea.

The reduced rate of salary allowed by the act of last session deducting the necessary expenses of his office, would have left him scarcely any compensation, and the board must have lost his valuable services but for the inducement they were able to offer by the additional appointment they have mentioned. The particular duty referred to, having been performed, the board can no longer offer this inducement, yet, it must be obvious, that as the objects of their care are constantly multiplied and enlarged, the necessity becomes greater for the aid of an intelligent and experienced officer, to re-

ceive communications and effectuate the views of the commissioners, and furnish them at their meetings with full, exact and digested information.—They submit this matter to the consideration of the legislature, and respectfully suggest the propriety of allowing them such a discretion in regard to compensation as will enable them to keep the office of secretary efficiently filled, as it hitherto has been. They are persuaded it will be advantageous to the commonwealth.

Before closing this report, it is proper to mention, that at the present session of the board, the expediency of changing the dimensions of the locks on the Susquehanna and Juniata divisions has been fully discussed, and that a resolution has been passed increasing their width to 17 feet, so as to correspond with those already built upon the eastern division. No increase of expense worthy of notice will be the consequence of this change, which is believed to be recommended by strong considerations of public convenience.

By order of the board.

DAVID SCOTT,

President of the Canal Commissioners of Pennsylvania.

Harrisburg, December 25, 1827.

LIST OF DOCUMENTS.

Series 1st—Letters to and from Engineers, May 2, 1827.

- No. 1. Copy of letter to W. Strickland and N. S. Roberts.
2. Copy of a letter to J. Geddes, D. B. Douglass and S. Guilford.
3. Answer of W. Strickland.
4. Answer of N. S. Roberts.
5. Answer of D. B. Douglass.
6. Answer of J. Geddes.
7. Answer of S. Guilford.

Series 2nd—Documents relating to the termination of western Division.

- No. 1. Communication from Pittsburgh Committee to the Board.
2. Resolution of the Board, February 1827.
3. Instructions to N. S. Roberts, Feb. 13, 1827.
4. Resolutions of the Councils of Pittsburgh, April 25 1827.
5. Report of N. J. Roberts.

Series 3d.—Documents relating to the Western and Kiskeminetas Division.

- No. 1. Report of A. Lacock, acting commissioner, December 1827.
2. Statements and report of James D. Harris, Engineer, Western Division.
3. List of contracts, &c. western division from No. 1, to 92.
4. List of contracts, &c. western division, from Pine creek to the Monongahela.
5. Statement of work done, and money paid on the western division, from the mouth of Kiskeminetas to Pine creek.
6. Statement of work done, and money paid on the western division from Pine creek to the Monongahela.
7. Schedule shewing the names of contractors, amount of contracts, probable cost, &c. on the Kiskeminetas division.
8. Statement of work done, and money paid on the Kiskeminetas division.
9. List of Engineers, &c. western division.
10. List of Engineers, &c. Kiskeminetas division.
11. Statement of damages paid by agreement on the western and Kiskeminetas divisions.

12. Statement of damages *agreed* to be paid on the western and Kiskeminetas division—not yet paid.
13. Report of Alonzo Livermore, Engineer of the Kiskeminetas division.

Series 4th.—Documents relating to the French creek feeder

- No. 1. Report of John Phillips, superintendant with documents therein referred to, marked—A. and C.
2. Report and estimate by James Ferguson engineer of the cost of the French creek feeder at contract prices.
3. List of engineers, &c. on the French creek feeder.

Series 5th.—Documents relating to the Eastern and Susquehanna Division.

- No. 1. Report of Charles Mowry, acting commissioner, with the several documents therein referred to, Dec. 1827.
2. Report of F. W. Hawle, engineer of the eastern division, with an estimate of the cost of its completion, Dec. 1827.
3. Report of Simeon Guilford, engineer on the location of the Susquehanna, June, 1827.
4. Estimate of the whole cost of the Susquehanna division, at contract prices, by S. Guilford, engineer.

Series 6th.—Documents relating to the location of the Juniata division, the place and mode of uniting it with the Susquehanna canal, and the place and mode of crossing the Susquehanna.

- No. 1. First report of Mr. Clinton, on the Juniata location.
2. First report of Mr. Guilford on the Juniata location.
3. Joint report of Messrs. Guilford and Clinton.
4. Communication from J. Miller, Esq. on behalf of citizens of Perry county.

Series 7th.—Documents relating to the Juniata division, as placed under contract.

- No. 1. Report of James Clarke, Esq. superintendant of the Juniata division, with documents therein referred to, marked A, B, C, D, E, F, G.
2. Report of Dewitt Clinton, Jr. engineer on the Juniata division, with an estimate of its cost, at contract prices.

Series 8th.—Documents relating to the Delaware division.

- No. 1. Report of Thomas G. Kennedy, superintendent of the Delaware division, with the documents therein referred to, marked A, B, C, D, E.
2. Report and estimate of Henry G. Sargent, engineer on the canal line from Easton to Bristol, and thence to Philadelphia.
3. Estimate of the cost of work on the Delaware division now under contract, at contract prices, by H. G. Sargent, engineer.

Series 9th.—Documents relating to the surveys.

- No. 1. Application of the members of the legislature for the appointment of John Mitchell and William Wilson, as surveyors.
2. Instructions to William Wilson and John Mitchell, Esqrs. in relation to the survey between the West branch and Allegheny.
3. Report of William Wilson, on his survey of the summit between West branch and Allegheny.
4. Report of John Mitchell, on his survey of the summit between West branch and Allegheny.
5. Supplementary report of John Mitchell on the same subject.
6. Report of Charles T. Whippo, engineer on the practicability of routes surveyed by Messrs. Wilson and Mitchell.
7. Report and estimate of a canal line on both sides of the North branch of Susquehanna, by John Randel, Jr.
8. Report—on the survey of a canal route through Chester and Lancaster counties, and estimate of a canal from the mouth of Swatara to a point near Columbia, by Major John Wilson, Engineer.
9. Report on the survey and location of a railway line, between Columbia and Philadelphia, by Major John Wilson.
10. Extract of a report of the canal commissioners of Maryland, and of an estimate by Judge Geddes of the cost of a canal on the west side of the Susquehanna, from the Conewago falls to the Maryland line.
11. Estimate of the cost of a canal on the East side of Susquehanna, from a point above Columbia to the Maryland line, by Charles T. Whippo, engineer.

12. Report on the examination of a canal line from Pittsburg, by Beaver and Shenango to the Conneaut summit, and from the head of the French creek feeder, by way of Waterford to Erie, by Charles T. Whippo, Engineer.
13. Report on the examination of a canal line, from Conneaut summit by way of Elk creek to Erie harbor, by major D. B. Douglass.
14. A report in relation to the supply of water, on the Conneaut summit, by Major D. B. Douglass.
15. A report on the survey of a canal route, along the Delaware from Carpenter's point to Easton, by Henry G. Sargent, Engineer.
16. An estimate of the cost of connecting the Schuylkill near the United States arsenal with the Delaware below the Navy yard, in the county of Philadelphia, by H. G. Sargent, Engineer.
17. Estimate of the cost of a canal from the mouth of French creek to Conneaut outlet, by James Ferguson, engineer.
18. Comparative view of the several routes between the Ohio and Lake Erie, deduced from the surveys of the last and present seasons.
19. List of engineers, assistant engineers, superintendents, engineers and clerks employed upon the surveys during the year 1827.

Series 10th—Miscellaneous.

- No. 1. Statements showing the cost of each division of the Pennsylvania canal, the amount at which it was estimated, and naming the engineers who made such estimate.
2. Copy of the journal of the canal commissioners.

Series 1.

LETTERS TO AND FROM ENGINEERS, MAY 2, 1827.

1. *Copy of a letter to Messrs. Strickland and Roberts.**Harrisburg, May 2d, 1827*

SIR,

A recent act of the legislature has limited the compensation to be allowed in future to engineers in the service of the canal commissioners, and has made other provisions to which the original terms of your engagement must necessarily yield.

I am directed to state, as the opinion of the board, that the operation of this act upon the amount of your salary will commence on the first day of June next, and that its provisions, as to the payment of contingent and personal expenses, took effect at the moment of its passage. It is deemed but just to apprise you of this construction, and to give you an opportunity of stating any different views which you may entertain of the nature and force of the contract already subsisting. I am further directed to inform you, that by a resolution of the board, passed this day, you have been re-appointed an engineer, upon the terms and conditions of the act of the 16th April, 1827. Such appointment to take effect from and after the first of June next. To avoid misapprehension, these terms are now distinctly stated. You will be allowed a salary of \$2 00 a year, payable quarterly. You will "receive no pay or compensation for any time during which you shall not be actually employed." No allowance can be made beyond your salary "for personal, contingent, or other expenses, under any name whatever." It is also provided by law, that you "shall not absent yourself from attending personally to the operations on the canal under your direction, except in case of sickness or necessity."

The board are exceedingly anxious that the benefit of your services may be secured to the commonwealth, and they sincerely hope, that the change of terms will not prevent your continuance in their employment. An early answer to this communication is particularly requested.

Very respectfully,

Your obedient servant,

Signed.

JOS. M'ILVAINE

William Strickland, Esq. Engineer.

2. Copy of a letter to Messrs. Geddes, Douglass and Guilford.

Harrisburg, May 2, 1827.

SIR,

I am directed to inform you that the canal commissioners of Pennsylvania have this day appointed you a chief engineer in the service of the Commonwealth. They propose to assign you, (here follows a description of the duty marked out for each.)

The board sincerely hope that the terms they are authorised to offer, will prove satisfactory, and that you will be able to enter at once upon the duties of the station. It is deemed advisable however, as a recent act of the legislature has so defined those terms as to leave the board no discretionary power, that they be distinctly stated at this stage of the business.

Your salary will be \$2000 a year, payable quarterly—and it is expressly provided by law, that you shall not “receive any pay or compensation for any time during which you shall not be actually employed,” and that no allowance be made beyond that sum for personal, contingent or other expenses, under any name whatever. I have to request that you will signify your acceptance of this appointment as early as possible.

Very respectfully,

Your obedient servant,

JOS. M'ILVAINE, Sec'y.

3. Copy of answer from W. Strickland.

HARRISBURG, May 2d, 1827.

SIR—The engagements of my business, which the claims of an increasing and dependant family do not permit me to renounce, are such as to make it impossible for me to devote myself *exclusively* to the duties of engineer under the board; and as I understand by the law recently passed, the terms of which, are communicated in your letter of to-day, the engineers in the service of the state, are required to be in constant attendance on the line of canal, I am compelled to tender my resignation of the situation which I have so far had the honor to hold.

I am sure it is unnecessary, though I trust it will not be deemed improper for me to say, that I yield to the necessity of this step, with painful reluctance. Feeling, as a native and a citizen of Pennsylvania, a proper degree of pride in the stupendous work which is now begun under the auspices of the board, it was for me an object of peculiar interest, as an engineer, to assist, with however humble capacity, in its progress to completion. I withdraw myself, therefore, from this employment, with the strongest and most unaffected regret.

I beg leave to add, that if by occasional visits of inspection and advice to the division heretofore under my more immediate charge,

I can in the opinion of the board, at all promote its rapid and proper execution, I shall hold myself pledged to obey their wishes. Of course, all such service on my part, will be without further charge to the state, than the amount of my absolute expenditures while so engaged.

I have the honor to be,
Most respectfully, Sir,
Your very obedient servant,
WILLIAM STRICKLAND.

To Joseph M'Ilvain, Esq.
Secretary of Board Canal Commissioners.

4. Copy of answer from N. S. Roberts.

HARRISBURG, May 2d, 1827.

SIR—Yours of this date, informing me of the opinion of the board upon the late act of the legislature concerning the engagements between myself and the board of canal commissioners, I have duly considered, and have made up my mind upon the subject. I cannot enter into any certain engagement on the terms therein mentioned, after said law takes full effect. But as the canal commissioners have treated me in all respects, fairly and honorably, I hope I shall not be wanting in respect to them. I will therefore state, that if it is their request, I will continue in the service until arrangements can be made on the line where I have charge, and give all the information in my power, to any successor who may be appointed. I should not like to continue longer than the middle of July, when I must be at liberty to visit my family, which I have done but once since I came to this state.

I remain, Sir,
With considerations of respect,
Your friend and obedient servant,
Signed, NATHAN S. ROBERTS,
Engineer western section Pennsylvania canal.

Joseph M'Ilvain, Esq.
Secretary of the board of canal commissioners.

5. Copy of answer from D. B. Douglass.

Harrisburg, 2nd May, 1827.

DEAR SIR,

I have to acknowledge the receipt of your letter of this date, communicating on the part of the board of canal commissioners, the fact of their having conferred upon me the appointment of chief engineer, in the service of this commonwealth; and assigning to me as such, the construction of the French creek feeder, and the survey of the several routes from the Allegheny to Lake Erie, &c. &c.

In reply to this communication I have only to observe, that although I feel a deep interest in the service of the commonwealth, and would very cheerfully contribute any means in my power, to promote the system of internal improvement, recently adopted. I am constrained in the present instance, by the conditions necessarily annexed to the employment, and which appear to me incompatible with the nature and degree of the responsibility, to decline it.

I embrace this opportunity of expressing my thanks to the board, for their kindness on this, as on many other occasions, and of renewing the assurances of esteem and regard with which

I remain, very sincerely
and truly, yours,

D. B. DOUGLASS.

Signed,

Joseph M'Ilvaine, Esq.

6. *Copy of answer from James Geddes.*

Harrisburg, May 2d, 1827.

GENTLEMEN,

In answer to your note of this day, I have to observe that there is an existing contract entered into in March last, between the Secretary of your board and myself, according to which, I am to serve the state of Pennsylvania, on the same terms throughout the season that were agreed on between us last year. But that the commissioners may be enabled to pursue the very *spirit* of the law of April 16th, 1827, I waive my right to continue through the season.

Very respectfully, I am Gentlemen,
your most obedient servant.

Signed,

JAMES GEDDES.

*The board of the Pennsylvania
Canal Commissioners.*

7. *Copy of answer from S. Guilford.*

Lebanon, May 2d, 1827.

SIR—

I have this day received your letter, informing me that the canal commissioners of Pennsylvania had appointed me a chief engineer in the service of the commonwealth, proposing to assign me the location, and construction of the canal, authorised to be constructed along the valley of the Delaware. The salary being \$2,000 a year as authorised by law, I accept the appointment, and will enter upon the duties of the station, on or before the first day of June.

Very respectfully,

Your ob't servant,

SIMEON GUILFORD.

Signed,

Joseph M'Ilvaine, Esq.

Sec. Penn. Canal Commissioners.

Series 2.

Documents relating to the termination of the western division.

No. 1.—*Communication from Pittsburg committee to the board.*

HARRISBURG, February 5, 1827.

GENTLEMEN—

On behalf of the select and common councils, and citizens generally of the city of Pittsburg, we have the honor to submit to your consideration, the following proposition:

That you rescind the resolution passed in September last, in Philadelphia, suspending the work upon the canal from Pine creek to the city of Pittsburg, and that you extend the location upon the upper level, as adopted by yourselves and approved by the governor, through the city, upon such line as you may think best, into the Monongahela river:—This extension to be expressly predicated upon the condition, that the amount of damages and the cost of extinguishing private rights shall not exceed a certain sum, to be limited by yourselves.

Upon the principle of this proposition we believe our citizens to be very unanimous, and it removes the most prominent difficulty in regard to the continuation of the canal; and as it places the amount of damages within your own controul, it also removes one of the causes which induced a reference of this subject to the legislature.

With respect, gentlemen,

Your obt. and very hum. servants.

(Signed,)

WM. WILKINS,
WALTER FORWARD,
JAMES RIDDLE,
HENRY BALDWIN.

To the Canal Commissioners of Pennsylvania.

2. *Resolutions of the Board, February, 1827.*

Resolved, That the board will continue the western division of the Pennsylvania canal, through the city of Pittsburg, either by a route from Washington street, between Penn and Liberty streets, to the Monongahela, or by a route from the city line round the point of Grant's hill, and along the east side of Smithfield street to the Monongahela, near the bridge: *Provided*, the damages to be paid for property on the former route, do not exceed ten thousand dollars; or those on the latter, five hundred dollars.

Resolved, That the engineer for that division be instructed to ascertain and report to the board at their next meeting, the relative expense of erecting an aqueduct over the Allegheny at Pine creek, at or near Hare's Island, and at Washington street; and to furnish at the same time an estimate for a continuation of the canal from Pine creek on the west side, to the aqueduct scites at Hare's island, and Washington street, respectively.

Resolved, That if before the next meeting of the board, satisfactory assurance shall be given that the liability of the commonwealth for damages on either or both of these routes, shall not exceed the sum or sums assigned to them respectively, the board will proceed to erect an aqueduct across the Allegheny river, at such points as on the report of the engineer may be preferred, and to continue the canal from the east end of such aqueduct to the Monongahela, by one of the routes above described.

S. Instructions to N. S. Roberts, Engineer.

Philadelphia, Feb. 13, 1827.

SIR,

Enclosed is an extract from the minutes of the canal commissioners, containing their late resolutions as to the termination of the western division of the Pennsylvania canal.

That every facility may be afforded to the parties interested, and full effect given to the intentions of the board, you are requested as soon as possible, to lay off on the ground the designated routes through the city. It is yet uncertain which of three points may be selected for the construction of an aqueduct, and which of two routes from the city line to the Monongahela, may be preferred.— You will be careful therefore, to run all lines within the city which can be occupied by the canal, in any event contemplated by the enclosed resolutions. Having done this, you will prepare a draft of the several lines, and will designate as accurately as possible, the property through which they pass; the quantity required for public use; the buildings necessarily destroyed or mutilated; the probable expense of each line exclusive of injury to private property, and any other particulars which may occur to you. You will furnish a copy of such draft and specification as soon as prepared, to the mayor of the city, for the use of the corporation and of the citizens generally, retaining the original, for the information of the board.

The board are anxious, that the painful questions yet pending on the western division, may be finally disposed of at their next meeting. For the materials on which to found a correct decision, they rely with great confidence upon your industry and skill. You will make the several examinations near Hare's Island and Washington street, and upon the ground between Pine creek and those points, at such times as not to interfere with your other arrangements; taking

care, however, to be ready with a report and estimates by the first of May.

A copy of these instructions and of the resolutions enclosed, will be forwarded to the mayor of Pittsburg. You are requested to give him notice of the commencement of your locations within the city, and to afford all persons interested an opportunity of being present, if they desire it.

Very respectfully,

Your friend and servant,

Signed,

JOS. M'ILVAIN,
Sec. Canal Com.

4. *Resolutions of the Councils of Pittsburg.*

At a meeting of the select and common councils of the city of Pittsburg, held on the 25th day of April, 1827, the following preamble and resolutions were adopted:

Whereas the select and common councils of the city of Pittsburg, being fully convinced, that the passage of the canal to the river Monongahela, by either Liberty or Smithfield street routes, will be attended with very serious expense from the injury to private property and heavy consequent damages, which will render them impracticable within the limits prescribed by the board of canal commissioners; also, that great public inconvenience will be experienced by crossing the various streets and alleys. Being also convinced, that by adopting the route to the Monongahela at Suke's run, either by a tunnel or open cut across Grant's hill, the inconveniences will be avoided and the interest of the city greatly promoted.

Be it therefore resolved by the Select and Common Councils, That the board of canal commissioners be respectfully but earnestly requested to adopt the latter route; and in that event the faith and funds of the city be pledged, that the expense of making the canal, tunnel and bridges, according to the report of the engineers, including damages to private property as well as all other attendant expenses, shall not exceed the sum estimated by the engineer, as the cost of the Liberty street and Penn street route with the addition of the ten thousand dollars for damages to private property, allowed by the board, in their resolution of February last.

And be it further resolved, That the mayor and the presidents of the select and common councils, be and are hereby authorised and empowered, on behalf of this city, to make, enter into and execute such contracts, agreements and engagements, with the board of canal commissioners, in manner, and form as shall be by them directed, for carrying into effect the foregoing resolution in good faith, according to its intent and meaning; and that such contracts, engagements and agreements, shall be and are hereby declared to be binding and obligatory on the city, to all intents and purposes.

And it is further resolved, That the mayor of the city be instructed to communicate to the president of the board of canal commissioners, a copy of these resolutions under the seal of the city.

In common council read, considered and adopted.

E. G. ROBERTS,

Clerk Com. Council.

Read and adopted in select council, April 25, 1827.

SAMUEL H. SCOTT,

Clerk Select Council.

City of Pittsburg. SS.

I, John M. Snowden, Mayor of the said city, do hereby certify the foregoing to be a true copy of certain resolutions passed by the Select and Common Councils of the city aforesaid. In testimony whereof, and in compliance

[L. S.]

with the said resolutions, I have hereunto set my hand and caused the seal of the city to be affixed, this twenty-sixth day of April, A. D. 1827.

Mayor's Office, Pittsburg, April 26, 1827.

SIR—

I have the honor to enclose you the annexed attested copy of sundry proceedings and resolutions of the select and common councils of the city of Pittsburg, which I beg leave respectfully to request that you will cause to be presented to the board of canal commissioners, at their first meeting, which I understand will take place some time in May next.

I am also requested to inform the board through you, that a further examination of the different proposed routes through the city, for the termination of the canal is now making under the authority of the city, and that the councils respectfully request of the board of canal commissioners that they will suspend deciding on this important question, until time has been afforded for receiving the report.

I have the honor to be,

Your ob't. servant,

Signed,

JOHN M. SNOWDEN.

Mayor of the city of Pittsburg.

Wm. Darlington, Esq.,

President of the board of Canal Commissioners.

No. 5.

To the President of the board of canal commissioners of the Pennsylvania canal.

GENTLEMEN,

In obedience to your resolution and instructions, dated 8th February, 1827, the following surveys and estimates have been made, viz: Beginning at the lower end of section No. 92, and making a lock of six feet below the Deer creek level and continue the same level to a point below Hare's island, and also to a point opposite Washington street, for the purpose of re-crossing the Allegheny river, at one of those places by an aqueduct. Divided into sections as follows.

		One lock 6 feet lift at \$500	\$3600 00
Section 93	length 18ch	Excavation 2544 yds at 6cts.	152 64
		Embankment 5522 yds at 9cts.	496 98
94	length 21	Excavation 2835 yds. at 6cts.	170 10
		Embankment 3717 yds. at 9cts.	334 53
		Grubbing in orchard	20 00
95	length 21	Excavation 2717 yds. at 6cts.	163 02
		Embankment 8499 yds. at 9cts.	764 91
		Grubbing 14 ch. at \$4	56 00
96	length 18	Excavation, 333 yds. 6 cents,	19 98
		Embankment, 1150 yds. 10 cts.	1115 00
		Grubbing 18 chains, at \$5	90 00
97	crossing Pine cr.	24 Excavation, 4692 y. 10 cts.	469 20
		Embankment, 48,206 yds. 10 cts.	4820 00
		Grubbing, 14 chains at \$5	70 00
98	passing Buffington's,	21 Excavation, 11,862 yds.	
		at 10 cents,	1186 20
		Embankment, 7824 yds. 10 cts.	782 40
		Grubbing, 11 chains, at \$3	33 00
99	length 21	Excavation, 8145 yds. 10 cts.	814 50
		Embankment, 4800 yds. 10 cts.	480 00
		Grubbing, 11 chains, \$4,	44 00
100	length 21	Excavation, 11,113 yds. 10 cts.	1111 30
		Embankment, 389 yards, 10 cents,	38 90
		Grubbing, 11 chains, \$4,	44 00
101	length 18	Excavation, 14,076 yds. 10 cts.	1407 60
		Grubbing, 18 chains, \$5,	90 00
102	crossing Gurtie's mill,	24 ch. Excavation, 7793	
		yards, at 6 cents,	467 58
		Embankment, 22,423 yds. 10 cts.	2242 30
103	length 21 ch.	Excavation, 5976 yds. 7 cts.	418 32
		Embankment, 2712 yds. 10 cents,	271 20
104	passing Salt Works,	24 ch. Excavation, 7873	
		yards, at 7 cents,	551 11
		Embankment, 12057 yds. 10 cts.	1205 70
		Slope wall, 950 perches, at 75 cts.	712 50

Sec. 105 passing Hare's, 18 ch. Excavation, 9774 yds.	
at 10 cents,	\$ 977 40
Embankment, 2400 yds. 10 cents,	240 00
Grubbing, 15 chains, \$4,	60 00
106 length 21 ch. Excavation, 9114 yds. at 9 cts.	820 26
107 21. Excavation, 6972 yds. 9 cents,	627 48
108 to upper aqueduct to the curve, 10 ch. Excavation, 4340 yds. 9 cts.	390 60
	<hr/>
	27,359 30
Embankment, 25,399 yards 8 chains 10, to river to common aqueduct, at 10 cents,	2539 90
On south side of river, 10 ch. Embankment, 20,907 yards, at 10 cents,	2090 70
To end of section 108, old line, 13 chains. Excavation, 10,095 yards, at 7 cents,	706 75
Grubbing orchard,	30 00
109 south side, 21 ch. Excavation, 3885 yds. 6 cts.	233 10
Embankment, 1449 yds. 10 cents,	144 90
110 Spring alley, 21 ch. Excavation, 1050 yards, at 6 cents,	63 00
Embankment, 8043 yards, 10 cents,	804 30
111 to Washington street, 230.7 ch. Excavation, 995 yards, at 6 cents,	59 70
Embankment, 9527 yards, 10 cents,	95 70
11 road and farm bridges, at \$400,	4400 00
Aqueduct at Pine creek, high level, 10000	00
Culvert at Gurtie's run,	1000 00
Do. at Salt Works,	250 00
	<hr/>
	11,250 00
Aqueduct over the Alleghany below Hare's Island, 1100 feet,	96,667 00
Making 2 miles 14 chains of Butler turnpike roads, at \$20,	3480 00
Add for contingencies 10 per cent,	15078 13
	<hr/>
Estimated expense from Pine creek to Washington street, crossing at Hare's Island,	\$165,859 48

The expense of constructing the canal on the same level, and of continuing the same to a point opposite Washington-street, and there crossing with an aqueduct and terminating in Spring alley, between Liberty and Penn-streets, as follows:

From Pine creek to the commencement of the curve, for the crossing below Hare's island,	\$27,359 30
Sec. 108, 11 ch. excavation 4774 yds. a 9 cts.	\$429 66
Sec. 109, Saw mill run 27 ch. excavation 10948 yds. a 7 cts.	766 36
Embankment 47588 yds. a 10 cts.	4758 80
Grubbing 4 ch. at \$4,	16 00

Sec. 110 Goes to the river opposite Wash-		
ington-street, length 32.53.		
Excavation 37040 yds. a 7 cts.	\$2592	80
Embankment to river 39,654 yds. a 10 cts.	3965	40
South side of river in Washington-street to		
Spring alley—		
14 ch embankment from river 15,528 yds. at		
10 cts.	1552	80
Excavation 4836 yds. a 7 cts.	303	62
Road and farm bridges, 8 a \$400,	3200	00
Butler turnpike road to be made 2 m. 32 ch.		
at \$40,	3840	00
Aqueduct at Pine creek, on high level,	10,000	00
Culvert at Gurtie's run,	1000	00
Do at Salt works,	250	00
Do. at Saw Mill run,	1000	00
	<hr/>	33,775 34
Aqueduct over the Allegheny at Washing-		
ton-street, 1100 feet long,	96,667	00
Add for contingencies, 10 per cent.	15,780	16
	<hr/>	\$173,581 80

In pursuance of that part of my instructions from the board, which relates to the canal passing through the city of Pittsburg to the Monongahela river, the following surveys and estimates, with a plan and profile of the same, has been made, a copy of which has been deposited with the mayor of the city of Pittsburg for the use of the corporation. Said report is as follows, viz.

To the Hon. the Mayor of the city of Pittsburg.

SIR—Agreeably to a resolution of the board of canal commissioners, dated Harrisburg, 8th February, 1847, I am directed to furnish you, for the use of the corporation of the city of Pittsburg, a draft and specifications of the several canal routes through the city, as therein mentioned: and in pursuance of which, I have made the following surveys and estimates of the canal routes through the city of Pittsburg, which are laid off and staked out upon the ground, viz.

From the abutment of the proposed aqueduct at the foot of Washington-street, on the Allegheny river, thence along the centre of Washington-street, and to the left of, and parallel to Grant street, (about half the width of the canal) to the foot of Grant's hill, near the head of Hog's pond; thence along the said pond and the foot of Grant's hill, to a point 80 feet from the easterly side of Smithfield-street to the Monongahela river, above the bridge, terminating at a point parallel to the fan of the abutment of said bridge.

A map shewing the lines and curves of the canal, and the profile of the ground will accompany these specifications.

In viewing the actual location of the canal, as staked out on the above route, it appears that the lots of ground to be more or less occupied by the buildings which will be more or less injured or destroyed by the canal, will be as follows:—Beginning at the foot of Washington street, the embankment will cover about 42 feet of lot No. 74, near the aqueduct, but will diminish in width as the ground rises towards Penn street. On the left hand side 35 feet will be covered more than the breadth of Washington street, at the lower end, and five feet more at Penn street. A small brick magazine will be partly covered, on the left side of Washington street, and about ten feet taken off the small houses and sheds on the S. E. corner of Washington street and the turnpike. Between Penn and Liberty streets, the canal will occupy four feet on Penn street, and thirty feet on Liberty street, from lot No. 75. From Liberty street, the centre line curves and runs to the left of and parallel to Grant street, on vacant ground, but the canal will occupy about half Grant street as it now runs. The canal tow path will take a small kitchen from a house occupied by Mr. Bower, near Seventh street, and near the head of the little ponds, the canal will remove two small shops or stables built of wood. Here the canal curves and runs on vacant lots of ground along the ponds and the foot of Grant's Hill to lots No. 426 and 427, on which is a tannery which must be wholly removed. On lots No. 421, 422, the canal is part in the pond and part on the hill side, to Fifth street, where the pond ends. From Fifth street the line runs on lots 377, 378, and a small part of 376, to Diamond alley. Near Diamond alley the line curves, and the centre line of the canal is 30 feet from and runs parallel to the easterly side of Smithfield street to the termination in the Monongahela river. Between Diamond alley and Fourth street, the canal will occupy a part of 363, 364, 365, and part of 366. The cutting in the centre is 53 feet; the lower side cutting is 22 feet, and the upper 83 feet. The slope of the sides being 18 inches to a foot. This is on Grant's hill, which is composed of indurated clay and veins of rock of several kinds. (It is probable this would stand at an angle of 60°, if so much cutting might be saved.) It may answer to cut the slopes to a steeper angle, if so it would take less breadth up the hill, &c. Towards Fourth street the hill subsides. From Fourth street the canal will occupy lots 307, and the slopes part of 306 and 308, quite to Third street. Between Fourth and Third street, the following buildings will be injured, and destroyed:—On lot 308, a wooden house and stable, to be removed; on 307, a brick house, occupied by Mr. Holdship, removed, and all the back buildings within the limits staked out, to be removed. The average width on these lots is 63 feet on the right, and 55 feet on the left of the centre line.

From 3d to 2nd street the canal will occupy lots No. 293, 294 and 295, on which the following buildings will be injured or destroyed: A chair maker's shop and all the kitchens and back buildings in the rear of houses fronting on Smithfield street, on lot No. 293, and a house on 294, occupied by Mr. Rahm, all to be removed.

and all other buildings, &c. within the limits staked out. From 2d to 1st street, the lots occupied by the canal are No. 208, 209, and 210. The buildings to be removed are a frame house on 210 fronting 2d street, two frame houses on centre of canal on lot No. 209, and on same lot a frame house fronting on Front street, and on 208 Mr. Anshut's brick stable, and on 210, two old log kitchens on Front street, all to be removed. From Front or 1st street the locks extend 400 feet to the termination in the river. The lots occupied by the locks are No. 195, 196, 197, the centre on 196. The following buildings to be removed and mutilated: a wooden stable and brick house and back buildings on lot No. 196 on Water street, and a brick and frame stable or kitchen joining the stone house on the corner of Water and Smithfield streets, and probably undermine the stone house on the said corner. Through the whole of this route, the centre line of the canal, the towing-path on the left and the bench or berm bank on the right are staked off on the ground and the stakes marked and numbered. The centre denotes the depth of cutting and the side stakes denote the distance from the centre where the excavation is to commence, and all the buildings between the outside or slope stakes are to be removed and are intended to be described. Those buildings standing near to, but outside of the slope stakes, may be injured if the ground is sandy, but those most exposed are intended to be described. All the staking off is recorded for inspection and future reference.

The expense to be incurred in constructing the canal on the Grant's hill route as above described, is as follows, viz:

Embankment at the abutment of the aqueduct, 15,528.	
32 yds. at 10 cents,	\$1552 83
No. 9, 27 ch. Excavation in the canal to go into the embankment, 20,318.06 yds, 1 cts.	2031 80
No 16, 21 ch. Excavation to the ponds along Grant's hill, 32,747.69 yds. 12½ cts.	4093 46
To 4th street 7 ch. 48 links, Excavation, cuts heavy upon Grant's hill, 58,428.85 yds. 2 cts.	11685 77
To head of locks, 7 ch. 50 links, Excavation from 4th to 1st street, to head of locks heavy cutting, 32,185.13 yds. 12½ cts.	4023 14
Lock pits $\frac{6}{9}, \frac{5}{5}, \frac{9}{7}$ Excavation from head of the locks to fan of abutment, the lock pits and wings, the excavation calculated to stand on an angle of 45° 33,947.31 yds. 12½ cts.	4243 41
Building 39 feet of lockage in four combined locks including the foundations and sheet piling, and all the materials of wood, stone, lime, sand, iron, &c. for the locks, the gates, &c. and their appendages and landing up the locks, the whole to be completed in a workmanlike manner, (and considering the great depth of the	

lock pits and the want of room to deposit such vast quantities of materials.) \$800 per foot lift, \$31,200 00

Nine road bridges over the canal, \$600, 5,400 00

Add for contingencies, 10 per cent, 6,423 04

————— \$43,023 04

Distance 69 ch. 57 links from river to river, \$70,653 45

Deduct difference in routes near Diamond Alley, 5,620 17

————— \$65,033 28

This is the line as recommended for examination at Harrisburg; but it may be varied between Diamond alley and Fourth street, and by occupying about ten feet of Smithfield street, and cut less on the declivity of Grant's Hill. The difference in cutting is 2,100 85 cubic yards, at 20 cents, \$3,620 17; but when completed the direct line in such deep cutting would be preferred. As the canal, from section No. 9 to the termination in the Monongahela, will afford a vast quantity of surplus earth and rock, or spoil bank, it is necessary that some place of deposit should be designated by the proper authority of the city. I have supposed it must go to the rivers principally from the south end.

As the ground from Fourth street to the river, is very valuable and the cutting deep, I take the liberty to calculate the quantity of wall which would be necessary to protect the sides, in order to save ground to the city.

The distance from Fourth street, to the head of the locks is 7 chains 50 links or 495 feet.

The average cutting for that distance is 21 feet.

The width to be cut open at the top averages 91 feet.

If the sides were walled nearly perpendicular the width necessary would be 60 feet in the clear at the top of the towpath. The wall required would be 5 feet at bottom, $2\frac{1}{2}$ at top and 15 feet high, 2250 perches.

To reduce the width of the lock pits (after the locks are completed) to 60 feet wide, would require a wall 300 feet long each side, average 5 feet thick and averaging 30 feet high above the coping equal to 3600 perch.

The second route for the canal through the city as surveyed, is situated between Penn and Liberty streets. The centre line of the canal is 100 feet from Penn street, and 140 feet from Liberty street. The distance from the Allegheny, at the proposed aqueduct to the Monongahela on this line is 85 chains 11 links. This line from Washington street, is perfectly straight, and the lockage is distributed as follows. A lock of 5 feet at Garrison alley, and 12 chains and 53 links forward. A lock of 5 feet is located at Bakers alley, and 36 chains forward. The remaining 29 feet of lockage is located, divided into 3 locks, 2 of 9 feet each and one of 11 feet lift which last terminates in the Monongahela river, about three chains above the point. By this location of the locks, the cutting will average nearly 8 feet, which will make it the more convenient

passing over the bridges, which must be built over the canal at every street and alley on the line.

The embankment and excavation necessary to make the canal from the proposed aqueduct to the Monongahela on this route is as follows, viz.

Embankment at proposed aqueduct	15,528.32 yds. 10 cts.	\$1552 83
Excavation in the canal which must nearly all be carried to the river and the embankment	41,150.71 yds. 15 cts.	6,172 60
Do. in lock pits,	25,269 yds. 15 cts.	3,790 35
Lockage 39 feet in 5 locks completed at \$800 per foot		31,200 00
13 Bridges for streets and alleys at \$600 each		7,800 00
Contingences 10 per cent		5,051 57

\$55,567 35

Distance 74. 41 from Washington street.

This canal is at present staked out, the size which the law requires, viz. 28 feet wide on the bottom, 40 feet at the top water line, and the towing path 8 feet wide, but no berm is included. I would recommend to the canal commissioners, to wall up the sides of the canal, and to reduce the width at top water line to 32 feet in the clear, and allow 8 feet for the tow path, which I would recommend to be made on the Penn street side of the canal, this would require but 30 feet for the canal and towing-path through the city. The wall required would be 6 feet high, average 2 feet thick, equal to 4500 perches. This line when completed would be the handsomest in the city.

Specifications and Descriptions.

The following width of ground will be occupied by the canal, from which must be removed all the buildings and improvements thereon, between Liberty and Penn street, as is staked out on the ground, beginning at Washington street, from thence to Wayne street, the average width required for the canal and tow-path will be 63 feet. This would be necessary, as a part of the distance the canal has some embankments. One frame dwelling house and a few small buildings to be moved.

From Wayne street to Garrison alley, the average breadth required is 54 feet. A small frame stable, and a shed, and the yards to be moved. From Garrison alley to Hand street, the average breadth required is $63\frac{3}{10}$ feet. The buildings to be moved are two small frame stables, several small dwelling and other buildings, and will take 4 feet from Jone's brick dwelling house.

From Hand street to Irwin's alley the average breadth required is 56 feet. The buildings to be moved, are several small wooden sheds and houses, a smith's shop and coal house, and half a brick stable on the left side of the canal. From Irwin's alley to Irwin's street, the average breadth required is $52\frac{2}{10}$ feet. The buildings to be moved are an Iron house, a tobacco warehouse, a shop and a small stable, all frame buildings, and on the left of the canal centre. takes 7 feet off a frame dwelling house, and on the right, a small stable of little value and 5 feet off another stable on the left, and a small

frame kitchen on the right. On Irwin street takes $1\frac{1}{2}$ foot off a frame house on the left, and a lime house, and frame, and several other buildings within the limits of the canal to be moved.

From *Irwin street* to *Barker's alley*, the average width required is 66 feet. The buildings to be mutilated or moved are 15 feet off Mr. Adam's large house, the whole of his octagon and two-thirds of the kitchen, also adjoining the alley, 4 vats and pump, frame and bark house, and part of a shop belonging to J. Thompson, Currier. From *Barker's alley* to *St. Clair street*, the average breadth required is 61 feet. Takes part of the vault of the Pittsburg brewery, and half a small brick building opposite the brewery and others of small value.

From *St. Clair-street* to *Cecil alley*, the average breadth required is 57 feet—takes on *St. Clair street* a large old frame dwelling house and stable, a small frame stable; and further on the line, a number of small wooden stables, &c. of small value, all to be moved from the limits staked out for the canal and towpath.

From *Cecil alley* to *Pitt street*, the average breadth required is $58\frac{13}{100}$ feet. Takes a frame stable of Mr. Hutchinson, and Mr. Hays frame stable. From *Pitt* to *Hay-street*, the average width required is 56 feet. The buildings to be mutilated or destroyed, are a new frame kitchen, a frame stable, a few fruit trees, the whole of a small brick house of Mr. Devo's. From *Hay-street* to *Marbury-street*, the average breadth required for the canal is 57 feet, and will take half of Mr. Little's brick house, and a part of a small frame kitchen on the left, and five feet off a frame house and a kitchen adjoining on *Marbury-street*. From *Marbury street* to the *Monongahela river*, the average width required is 77 feet. The buildings to be moved are, a small house on *Marbury street*, a small frame house, block maker's shop, a small frame dwelling house, a small frame stable, and part of a stable on the left; a frame carpenters shop, and one half the *Fort Pitt* magazine of stone, on the left, a small frame stable at head of lock No 4, a frame house, (old) a frame work shop, opposite lock No. 5, a frame stable on the left, near the river. There are various other back buildings and fences, and some other improvements in gardens within the limits staked out, difficult to describe, but the stakes will define the limits required, and which will be prudently adhered to, each distance being accurately measured and recorded for further reference. A very convenient basin for the city and Northern Liberties, can be made at or near *Washington street* and *Spring alley*, on either of these two routes of the canal.

In addition to the two canal routes directed to be located through the city by order of the canal commissioners, I have re-surveyed and located the *Juniata route*, at the special request of the citizens by their representatives. This line commences near the chapel, passes under *Grant's hill* by a tunnel, thence down the valley of *Suke's run* to its entrance into the *Monongahela*, which is about one mile from the point or junction of the two rivers. The line of the canal and of the tunnel, and a profile of the

same, is accurately laid down on a map herewith presented. This survey is to correspond with the Deer creek level, and supposes the canal to cross the Alleghany at Pine creek.

Estimated as follows, beginning at Washington-street.

Distance 16.30, Excavation to 2 ch. forward of No. 9, (Grant's hill route) 12,060.16 yds at 10 cents,
\$1,206 01

Do. 3.31 do. Rising Grant's hill to 30 ft. cutting, earth and rock, 9,118.89 yds. at 15 cts. 1,367 83

All to be drawn perhaps, to Hog's pond.

Do. 12.29, Tunnel 800 feet, equal to 20 feet diameter, through indurated clay and layers of rock, at \$25 per foot lineal, 20,000 00

NOTE.—As the hill appears to be composed of alternate layers of earth and rock, it is highly probable it must be arched with cut stone masonry, supposing the inside to be 18 feet in the clear, and the arch 18 inches thick=2981.48 perches, at \$4 a perch, including centering, \$11,925 92

(An open cut instead of a tunnel, contains 151,582.04 cubic yards, at 20 cts. per yd. amount \$30,316 40.)

Distance 6.28, Excavation from 30 feet cutting on the east side to lock No. 1, to be drawn some distance, 8,848.55 yds. at 15 cts. 1,327 28

Do. 2.00 do. Between 1st and 2d locks, 1,085.32

Do. 2.00 do. do. 2d and 3d locks, 2,198.24

Do. 6.76 do. do. 3d and 4th locks, 5,129.44

Do. 2.00 do. do. 4th and 5th locks, 1,486.88

Yards 9,89.988

At 10 cents, 989 98

Do. 10.96 do. In 5 lock pits, 17,689.57 yds. some rock, at 15 cts. 2,653 43

Do. 61.90 Lockage 45 feet in 5 locks, at \$600 per foot lift, 36,000 00

Building an arch under the road 863 per. at \$2 50, 2,157 50

Do. 1 road bridge below mouth of tunnel, 342 50

Add for contingencies, 10 per cent. 7,797 04

\$85,767 49

Tunnel Route.

Distance 61 chains	90 links from Washington street to	
	the mouth of Sukes Run, estimate,	\$85,767 49
do. 69,	do. 57 links by Smithfield street, from	
	river to river, estimate,	65,033 28
do. 85,	do. 41 links by Liberty and Penn street,	
	from river to river, estimate,	55,567 36

As the high level from Pine creek to Pittsburg, which has been run for the purpose of re crossing the Allegheny river on an aqueduct at either of the proposed places, and from thence through the city to the Monongahela by any route which has been examined, would be very inconvenient and expensive. I recommend to the board the following location, which is estimated and located as follows, viz. Make a lock of nine feet at Pine creek, thence continue that level along the peninsula, and below the narrows, and near Hare's make another nine foot lock. This will place the canal to much better advantage along the bottom and the narrows, and the Butler turnpike road can be placed on ground much safer than on the steep declivities of those precipitous hills which are so liable to slope. Continue this level to a short distance above Saw Mill run, there make a lock of five feet lift, and enter the valley of Saw Mill run, which is very favorable for a large natural basin, and a water weir, and for connecting the canal to the river, opposite the Northern Liberties by two locks, one of nine feet, the river lock of thirteen feet. From the basin at the Saw Mill run continue the level along the bottoms through Allegheny town, below the street leading to the bridge, here lock into the river by two locks, one of nine feet, the river lock of thirteen feet, and a convenient basin at the head of the upper lock, for all which the ground is very favourable.

The estimated expense of the canal and locks on the above levels is as follows, viz. Beginning at the lower end of section 92, above Pine creek:

Sec. 93,	length 18 chns.	excavation 6869 yds.	at 6 cts	\$412 14	
94	21	do.	8673	6	520 38
95	21	do.	9324	6	559 44
		Grubbing 14 chains,	at \$4,	56	
96	18	do.	3330	6	199 80
		Embankment	1548	10 cts.	154 80
		Grubbing	18	\$5	90 00
97	24	Excavation	4878 yds. crossing Pine		
		Creek		10 cts.	487 80
		Embankment	37528	10	3752 80
		Grubbing	14 ch'ns.	\$5	70 00
98	21	Excavation	17,766 yds. (passing		
		Buffingtons)		10 cts.	1776 60
		Grubbing	11 ch'ns.	\$3	33 00
99	21	Excavation	12,382 yds.	10	1238 20
		Grubbing	11 ch'ns.	\$4	44 00
100	1	Excavation	19,173 yds.	10	1917 30
		Grubbing	11 ch'ns.	\$4	44 00

101	18	Excavation 24,282 yds.	10	\$2428 20
		Grubbing 18 ch'ns.	\$5	90 00
102	Gurties run 24	Excavation 9214 yds.	6	552 84
		Embankment 14113	10	1461 30
103	21	Excavation 7794	7	545 58
104	Millers salt works 24	Do. 15,165	7	1061 55
		Embankment 6608	10	660 80
		Slope wall 4 ch. 30 high, 3 thick, 950 per.	75 cts.	712 50
105	Hare's, 18	Excavation 19,173 yds.	10 cts.	1917 30
		Grubbing 15 ch'ns.	84	60 00
106	passing locks of 9 feet lift 21 ch	excavation 13,517 yds.	7 cts.	946 19
107	do.	21 excavation 7182 yds.	6 cts.	430 92
108	do.	21 do. 8673 yds.	6 cts.	520 38
109	passing locks of 5 feet lift 24 ch.	excavation 8689 yds.	6 cts.	512 34
		Grubbing 4 ch.	84	16 00
		Embankment at Saw Mill Run, 7696 yds.	10 cts.	769 60
110	length 18 ch.	excavation 11814 yds.	6 cts.	710 64
111	length 27 ch.	do. 12096 yds.	6 cts.	725 76
112	length 15 ch.	do. 6844 yds.	6 cts.	410 64
		Embankment brick yd. 2490 yds.	10 cts.	249 00
113	length 23 ch. 73 links,	excavation 17,494 yds	6 cts.	1049 64
Whole distance 5½ miles or 440 ch 73 links, embankment 803, at 10 cts.				80 30
Terminating in the Allegheny below the bridge.				
Road and farm bridges, 10, at \$400,				4,000 00
Butler turnpike to be made anew 1 m 46 ch. \$5 per rod,				2,520 00
Aqueduct at Pine creek,				9,000 00
Culvert at Gurtie's Run,				1,000 00
do. at Salt works,				250 00
Waste wier at Saw Mill Run, 80 feet,				400 00
45 feet of lockage, \$600 per foot,				27,000 00
Extra on river lock, on foundation and landing up,				2,500 00
Add for contingencies, 10 per cent,				7,394 67
Expense of two <i>extra locks</i> at Saw Mill Run.				
Excavation (length 6 ch. 74 links) 9288, yds.				
	10 cts.		\$928 80,	
One lock of 9 feet lift, \$600 per foot,				5,400 00
One do. of 13 feet lift, \$600 per foot,				7,800 00
Extra on river lock,				2,500 00
Allow for contingencies 10 per cent,				1,662 88
				18,291 68
Amount of the estimate on the west side with <i>double locks</i> ,				99,633 09

Private damages done to buildings, except on the city side would be inconsiderable on either of these routes.—From the above estimates, the following appears to be the aggregate of expense on each route, exclusive of private damages, viz:

From Pine creek and crossing below Hare's Island and continuing between Liberty and Penn streets and terminating in the Monongahela	8219,874 00
By crossing at the same place and terminating above the the Monongahela bridge or the Smithfield-street route	229,339 93
By continuing down the west side and crossing at Washington-street, and terminating between Penn and Liberty-street, in the Monongahela,	227,596 32
By crossing at the same place, and taking the Smithfield-street route,	237,062 25
By crossing at Pine creek, and continuing on the east side down to Washington-street, by estimates of last year, [See report page 85,]	\$109,171 50
Add present estimate of the tunnel route through Grant's hill, on the high level, and terminating in the Monongahela, at the mouth of Sukes run,	85,767 49
	<hr/> 194,938 90

By excluding the aqueduct and tunnel and continuing the canal on the west side and terminating by a double set of locks in the Allegheny river, as represented in a map and profile of the same, 99,633 09

In pursuance of my instructions I take the liberty to state my opinion, with respect to the inconveniences or utility of each of these routes.

The best and most practicable route through the city is that between Liberty and Penn street. But this would be attended with many inconveniences to the citizens, by destroying a great amount of private property, and by having a bridge over the canal at every street and alley leading to the Allegheny river, and by having a combination of three locks at its termination.

The Smithfield street route, would be very inconvenient, on account of the great excavation to be made along the side of Grant's hill, and the very great difficulty of excavating to the necessary depth to sink the locks, which would destroy much valuable property, and the great inconvenience of passing a great number of boats through a combination of four locks thus situated.

The tunnel route in a public point of view may be considered as very objectionable, as all business coming to or from the Ohio river, or the Allegheny must pass through a tunnel, in addition to an aqueduct nearly as inconvenient as combined locks. And although the locks are separated, they are located in a narrow valley with steep banks, or hills on each side, a very inconvenient plan to do business and from its terminating in the most remote part of the city, at least one mile above the point.

On the line which is located on the west side, no such inconveniences arise. All that part of the line from opposite Hare's island, from opposite Allegheny town, is on the finest ground for building lots, and has but one curve in the whole distance. The locks are all separate and only two extra locks are necessary to supersede the necessity of an aqueduct and tunnel. The convenience of a dou-

The connection with the rivers and harbors, will be a great saving of time in the despatch of business. The upper locks will accommodate all the Northern Liberties, and a great part of the city to the Allegheny river, which during last summer had a sufficient depth of water from Hare's island along the Pittsburg side, to a bar running out at the point which can be removed, and by taking advantage of both sets of locks, boats can arrive and depart from any places of business on the Monongahela and Allegheny, at all ordinary stages of water; and when the present, and future amount of business to be done in that vicinity is considered, this location must have in my opinion a decided advantage over the inconvenient and slow progress of passing every boat over, and aqueduct through a tunnel or a combination of locks from the canal to the rivers and from the rivers to the canal.

By this location which would be safe and permanent, not only the business of Pittsburg which in its present limits does not cover more than 600 acres of ground, but the adjacent villages equally well situated for manufacturing, will have the great advantage of being conveniently connected by the same locks with that important branch of the Pennsylvania canal which is in contemplation to be extended to lake Erie, and the state of Ohio, without any additional expense to the commonwealth of Pennsylvania.

In giving my opinion of the above routes I believe I am authorised and justified in so doing, by my instructions from the board, a part of which are in the words following, viz:—"You are to keep it constantly in view, that this canal (the western section) is intended to form a part of a general system of internal navigation between the eastern and western waters of the state."

All which is respectfully submitted.

NATHAN S. ROBERTS, *Engineer*

On the western section of the Pennsylvania canal.

Harrisburg, 1st May, 1827.

Series 3.

No. 1.

To the board of Canal Commissioners.

GENTLEMEN—

The acting commissioner on the western division of the Pennsylvania canal, communicated to the board, at their session in June last, the propriety and expediency of attempting the completion on the first of March, 1828, of so much of the canal on the western division as lies between Pittsburg and the salt works, on the Kiskeminetas, a distance of fifty miles, and he stated *that* with a favorable season and great exertions this important object might be accomplished, and the board by a resolution at a subsequent session, enjoined it as a duty upon him to have the navigation opened at the time proposed, if in his power, how far he has respected this injunction, and endeavored to comply with the wishes of the board in common with his own, will appear from the following facts.

The Kiskeminetas and Pine creek lines of twenty five and half miles, was put under contract in the first part of July, and about the first of August, active operations were commenced by the contractors. The weather continued favorable until about the middle of October, when, what may emphatically be called "the rainy season" commenced, nor has there been five fair days in succession, from that time to the present 15th day of December, and it is now raining copiously. Within this time we have had several moderate freshets in our streams, and two floods resembling those at the breaking up of winter. When the first of these freshets came, the feeder dams on the Kiskeminetas was in an unfinished state, and a considerable portion of it was swept away. By this disaster the contractors, Messrs. Leech and Trucks, two enterprising and industrious men, have sustained, it is believed, damage to the amount of \$3000. They, however, as soon as they were directed, resumed their labors, increased their hands to about 200, and were soon ready with materials, on the ground, to repair the breach, but had made but little progress, when a second flood greater than the first, disappointed the hopes of all concerned and stopt the progress of the work.

The season was then far advanced, and the weather continued stormy and tempestuous, and the prospect of completing of the feeder dam, upon which the navigation of the whole line depended, was hopeless, until the return of spring. Orders were accordingly given to secure, in the best possible manner, what had been done and suspend the work on the dams, for the winter.

The acting commissioner having recommended this undertaking, owes it to himself and the board, to state expressly, that had not the present season been much more unfavorable, than any season for the last fifteen years, the navigation would have been opened, at

the time proposed. And whatever the board may think upon the subject, he is consoled by the reflection, that if the public expectations should not be realised, the fault will not be his, nor the agent upon the line employed by the government, but owing, exclusively, to circumstances and difficulties, that no human foresight could have discovered, nor human exertions overcome.

The contracts entered into for the construction of an aqueduct across the Allegheny river, near Pittsburg, the tunnel through Grant's hill, and the other work connected with them have already been reported to the board. The contractors of this work have nearly completed the excavation of earth from the Allegheny river, the north end of the tunnel, and a like progress has been made upon the Monongahela river to the south end, two of the lock's pits are excavated on this section, much stone provided for constructing the locks. From the appearance and nature of the rock, at the ends of the tunnel, it is believed it will be found sufficiently solid, and an arch of stone or brick to sustain the line of the tunnel, may be dispensed with. This will release the contractors from a heavy expense, and tend very much to facilitate their operations.

The progress made for constructing the aqueduct across the Allegheny river at Pittsburg, has not been equal to what was anticipated. The ground has been excavated and materials furnished for founding the abutments, these with some of the piers were to have been founded, and the buildings raised above the ordinary floods, so that the work might have been prosecuted early in the spring, but this has been prevented by high water. But the contractors have given assurances, and from the preparatory steps taken, little doubt can be entertained but they will fulfil their engagements at the stipulated time.

The connection directed by a resolution of the board, between the canal on the west side and the Allegheny river, "by locks and other necessary works," was put under contract on the 21st day of June last. This line of canal is about 60 chains in length. The excavation is completed. The fall of 45 feet has been overcome by five lift locks, two of these locks are completed and one other nearly done. To protect the river lock and form a safe and convenient harbor, it was found necessary to extend into the river on the upper side and in advance of the wings of the lock, a heavy stone wall, supported by a pier head where it was most exposed. This building together with the foundation of the lock, had to be founded near six feet below the surface of the water, at its lowest stage this season. At this depth the bottom was found, composed of loose materials, freely admitting the passage of water, that flowed in copiously, and it was kept down with great labor and difficulty. This, however, was so far effected to enable the workmen to lay the foundation and raise the pier head and protection wall with the wings of the lock, a considerable height, and here their progress was arrested by a sudden rise in the river, and a continuation of high water has suspended the work ever since. But all the materials for this lock are on the ground, and when the waters abate and the weather becomes favorable, this with every other lock on the line, 15 in number, will be completed in a few weeks.

The two abutments and three piers of the upper aqueduct, on the Allegheny have been completed. The remaining two piers are yet unfinished, and the continued high water in the river has stopt the progress of the workmen. The arches and other wood work from the east abutment to the third pier, have been raised, roofed and secured, and the whole work done on this important building, has been admired by all who have examined it, not only for its elegance and beauty, but for its complete adaptation to the purposes for which it was designed, and its promise of permanent usefulness.

By the voluminous reports of the engineers, the board will learn what has been accomplished and what remains to be done on this division of the Pennsylvania canal, of which the following is a brief extract.

There has been of excavation of earth	1,522,436 yds.
do. of rock	350,837
Embankment made	692,718
Stone wall for protection	22,398 perche
Mason work in locks, aqueducts, } culverts and bridges, }	32,307

It must be evident that the principal expense of a lock and canal navigation will arise from, and be applicable to, the work comprehended under the foregoing head, taken conjointly, and to settle a question that has been made a subject of dispute, an exact average has been made of the actual cost, on each branch of the work upon this line, and the following result has been obtained.

	\$	cts.	m.
Average price of earth per cubic yard		07	1
Rock do.		39	7
Embankment		10	2
Wall per perch		52	5
Road and farm bridges,	145	00	0
Fencing canal by the perch with } posts and boards, }		75	0
Average price of locks per foot lift complete,	\$	578	50
The gross amount of money received by the acting commissioner from the treasurer of the board has been up to this date, }	510,500	00	0
And his disbursement in the public works amount to	535,816	42	0
Leaving the balance due him from the common- } wealth, }	25,316	42	0

And it is but an act of common justice to state that the duties performed by the gentlemen composing the engineer department, were not only arduous but severe, and it is to their industry and perseverance that the public are indebted for the rapid progress made in the work this season, and when the amount of labor done, and the style in which it has been executed, is taken into the account, there can be no hazard in saying that it has cost less than any public work of the kind in the United States.

By a report made in the fall of 1825, the board well recollect that the danger to be apprehended from hill slips upon the Allegheny river, was strongly represented, and the acting commissioner is now

tree to declare that all his former apprehensions have been realised. Near thirty sections on the line, between Pittsburg and the Kiskeminetas, have been subject, less or more, to this inconvenience; and it will be seen by the report of Mr. Harris, that this and a few items of expense omitted, will increase the expense of constructing this line of canal, and raise it upon these sections, above the estimate of N. S. Roberts, Esq. the former engineer. But on the residue of the work upon the line, it has been found, when completed, to cost less than the estimate of that gentleman. But this formidable obstacle has been in a great measure overcome, for notwithstanding the excessive rains that have for two months past saturated the earth with water, there is no part of the line, were the canal supplied at this time with water, in which the navigation would be obstructed, and it is proper here to observe, that no hill slips of any consequence have taken place upon the Kiskeminetas line, and it is confidently believed, from the nature of the ground, that none will occur.

Mr. Livermore, in his report, states that the navigation can be opened agreeably to the contracts entered into at the last sales, from the salt works to Blairsville, on the first day of November next; and in this opinion the acting commissioner concurs; nor does he see any reason why, if the legislature should so direct, the line might not be extended 30 miles further to Johnstown, and completed at the same time. This last mentioned section, however, would be of little use, without combining it with a road across the mountain, these two important improvements should go hand in hand.

All of which is respectfully submitted,

A. LACOCK, A. C.

Canal Office, Dec. 15, 1827,

No. 2.

Statement shewing the amount of work remaining to be done upon the Western Division of the Pennsylvania Canal, from section No. 92, to the Monongahela, with an estimate of the cost of the same.

Sections,			
			YARDS,
Amount of excavation of earth,			128,086
do. do. rock,			12,184
do. embankment,			199,613
do. protection wall,	1000 perches,		1,000 00
			<hr/> 36,753 61
<i>Aqueducts.</i>			
Aqueduct over Pine creek,			86,768 72
at Pittsburg,			100,000 00
			<hr/> \$106,768 72

Locks.

Lock, No. 6,	\$ 231 25
No. 9,	470 00
No. 10,	5,267 52
	<hr/>
	\$5,468 77

Pierhead at outlet lock No. 10, (Allegheny)	\$862 50
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Culverts.

Culvert on section, 102,	\$867 50
do. on section, 104,	606 60
	<hr/>
	1,474 10

Waste Wiers.

4 waste wiers at \$230 each,	\$920 00
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Bridges.

7 wooden bridges,	1,050 00
2 of stone and wood,	2,746 80
	<hr/>
	\$3,796 80

Bridge Embankments.

9 bridge embankments,	\$1,937 00
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Fence.

1000 perches fence at 75 cents,	\$750 00
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Tunnel Contract, (Pittsburg.)

Amount remaining to be done,	\$54,000 00
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Abstract.

Amount required to complete the excavation of earth and rock, and embankment, and protection wall,	\$36,753 61
Aqueducts,	106,768 72
Locks,	5,968 77
Pier heads,	862 50
Culverts,	1,474 10
Waste wiers,	920 00
Bridges,	3,796 80
Bridge embankments,	1,937 00
Fence,	750 00
Tunnel contract,	54,000 00

\$213,231 50

The foregoing is a statement of work remaining to be done from section No. 92, to Pittsburg, with an estimate of the cost of the same amounting to \$213,231 50.

Very respectfully, yours,
JAS. D. HARRIS, *Engineer.*

Abner Lacock, Esqr. Acting Commissioner.

20, Nov. 1827.

Statement shewing the amount of work remaining to be done up on the western division of the Pennsylvania canal, from the mouth of the Kiskiminetas to section No. 92, with an estimate of the cost of the same.

Sections.

Amount of excavation of earth,	90,487 yards.	} \$33,147 07
do. rock,	29,556 do.	
Embankment	91,972 do.	
Protection wall, 885 perches,		513 75
		<hr/> \$33,660 82

Aqueducts.

Aqueduct at mouth Kiskeminetas,	\$19,500 00
do. over Buffaloe creek,	2,187 28
do. over Bull creek,	1,074 68
do. over Deer creek,	3,625 00
	<hr/>
	\$26,386 96

Locks.

Lock No. 1,	\$301 20
No. 2,	38 75
No. 3 and 4,	109 50
	<hr/>
	\$449 45

Culverts.

Culvert near Allegheny aqueduct,	\$700 00
do. on section 37,	125 00
	<hr/>
	\$825 00

Bridges.

1	bridge on section 5,	\$137 00
1	do. on section 21,	137 00
1	do. on section 23,	137 00
1	do. on section 27,	137 00
1	do. on section 32,	137 00
1	do. on section 74,	150 00
1	do. on section 75,	133 00
1	do. on section 78,	150 00
1	do. on section 80,	135 00
2	do. on section 83, (1 across a ravine \$150,)	285 00
1	do. on section 86, (across ravine,)	250 00
		<hr/>
		\$1,790 00

Bridge Embankments.

A bridge on sec. 2,	900 yards at 12½ cents,	\$112 50
on sec. 4,	1,200 do. 11 do.	132 00
on sec. 5,	2,500 do. 21 do.	525 00
on sec. 17,	1,455 do. 14 do.	203 75

A bridge on sec. 21,	800	yds.	11	cts.	\$ 88 00
on sec. 27,	100	do.	10	do.	10 00
on sec. 29,	400	do.	12	do.	48 00
on sec. 32,	730	do.	12	do.	87 60
on sec. 52,	1,200	do.	12	do.	144 00
on sec. 52,	260	do.	12½	do.	32 50
on sec. 57,	32	do.	12½	do.	4 00
on sec. 64,	242	do.	12½	do.	30 25
on sec. 65,	580	do.	12	do.	69 60
on sec. 73,	530	do.	9	do.	47 70
on sec. 74,	1,000	do.	12½	do.	125 00
on sec. 75,	690	do.	11	do.	75 90
on sec. 77,	860	do.	10	do.	86 00
on sec. 80,	530	do.	11	do.	58 30

13,109,

\$1,880 05
Fence.

Length of fence required 5124 perches at 75, \$3,843 00

Wastewiers.

9 wastewiers to be constructed at \$230 each, 2,070 00

Safety gates at large embankments.

16 safety gates at \$30 each, \$480 00

ABSTRACT.

Amount required to complete the excavation of earth and rock,
and the embankment and protection wall, \$ 33,660 82

Aqueducts, 26,386 96

Locks, 449 45

Culverts, 825 00

Bridges, 1,790 00

Bridge embankments, 1,880 05

Fences, 3,843 00

Wastewiers, 2,070 00

Safety gates, 480 00

Amount required to complete the canal, from the
mouth of Kiskeminetas to section 92, \$ 71,385 28

The foregoing is a statement showing the amount of work remaining to be done, from Kiskeminetas to section 92, with an estimate of the cost of the same, amounting to \$71,385 28.

Very respectfully, yours.

JAS. D. HARRIS, Engineer.

10th Nov. 1827.

A. LACOCK, Esq. Acting Commissioner.

From the foregoing statements and estimates, it will be seen that the cost of this portion of the canal will considerably exceed the estimates of 30th November, 1826. This is owing principally

A bridge	on sec. 21,	800	yds.	11	cts.	\$ 88 00
	on sec. 27,	100	do.	10	do.	10 00
	on sec. 29,	400	do.	12	do.	48 00
	on sec. 32,	730	do.	12	do.	87 60
	on sec. 52,	1,200	do.	12	do.	144 00
	on sec. 52,	260	do.	12½	do.	32 50
	on sec. 57,	32	do.	12½	do.	4 00
	on sec. 64,	242	do.	12½	do.	30 25
	on sec. 65,	580	do.	12	do.	69 60
	on sec. 73,	530	do.	9	do.	47 70
	on sec. 74,	1,000	do.	12½	do.	125 00
	on sec. 75,	690	do.	11	do.	73 90
	on sec. 77,	860	do.	10	do.	86 00
	on sec. 80,	530	do.	11	do.	58 30
<hr/>						
13,109,						\$1,880 05
<hr/>						

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JAS. D. HARRIS, Engineer.

10th Nov. 1827.

A. LACOCK, Esq. Acting Commissioner.

From the foregoing statements and estimates, it will be seen that the cost of this portion of the canal will considerably exceed the estimates of 30th November, 1826. This is owing principally

A List of entered into on *Western Division of Pennsylvania Canal*, from section No. 92 to the *Monongahela*, from 1st Nov. 1826, to 1st Nov. 1827.

Sections.	Names of	Price of Grubbing.	Price of Excavation of Earth.	Price of Excavation of Rock.	Price of Embankment.	Culverts.	Names of Contractors.	Price per Perch.
No. 93.	Samuel Dickey		5 cents 9 mills,		7 cents 9 mills.	On section No. 102,	William Bradley,	\$ 2 25
94.	Blakeley & Le		6 cents,		9 cents.	section No. 102,	Patrick Cassady,	2 50
95.	Miller and Fat	\$ 10 for section,			10	section No. 104,	John Scott,	1 70
96.	John Crandall,	Estimate of Engineer,			15	section No. 104,	Jeffy & Love,	2 50
97.	Washburn, Bro	\$ 200 for section,		45 cents,	16	section No. 109,	Cooper Barclay,	2 25
98.	Wilson Crawl	100 for do	12		10			
99.	James M. Cain	100 do	10	50	7			
100.	Riley & Cassa	100 do	7	49	9 m.			
101.	Castle, Eddy	100 do	8	50	8 cents.			
102.	William Bradl	100 do	8	35	6	Protection Wall.		
103.	Jackson, Gebb		6	37½	6	On section No. 104,	Enoch Jones,	1 00
104.	Enoch Jones,		5½	38	7			
105.	Riley & Cassa		12	50	12			
106.	Burns & Blac	15 do	8	80	7	Aqueducts.		
107.	William Bradl	40 do	6	37½	7	At Pittsburg, over		
108.	Burns & Blac	20 do	6	35	6	Allegheny river,	Le Barron & Lathrop,	\$100,000 to complete same
109.	C. & D. Rarc	50 do	6	37½	7	Over Pine creek,	Washburn, Bronson & Co.	2 94, per perch,
110.	Flood & M'L	15 do	6	37	7½			
111.	William Robis	30 do	5		9½			
112.	William Robis		7		9	Bridges.		
113.	William Robis		7		9	Two,	Everitt & Crawford,	\$150, for each,
						Three,	Benjamin Vandignt,	150, for each,
Locks.	Names of Contractors.	Price per Perch.			Bridge Embankment, &c.			Price per Cubic Yard.
No. 6.	Nicholas West,							
7.	Sanger & Flem	\$ 4 63			On section No. 102,	William Bradley,		12½
8.	Cahoons M'Farl	4 37½			section No. 107,	William Bradley,		10
9.	Provost, Byrne	50						
10.	Provost, Byrne	4 70			On sections Nos 111,			
		4 70			112 & 113,	Wm. Robison, Jr.		12½
Pier Head.	Names of Contractors.				Tunnel Job, Locks, &c. at Pittsburg.			
	Provost, Byrne	3 75						
						Mulloy, M'Avey & Co.		\$61,000
Bridges.	Names of Contractors.	Price of Wood Work.			Turnpike Road.			
At Allegheny Town,	Black	2 98	\$152		On section No. 99,	James M. Cain,	\$184	
At Penn street, Pittsburg,	Black	3 10	152		On section No. 100,	John Wynne,	130	
At Liberty street, do.	Colla	3 10	152		On section No. 101,	Eddy & Johnston,	\$3 per perch and \$100 for grubbing	
					On sect. No 101&2,	William Bradley,	8 cents per cubic yard.	
					On section No. 105,	James Lonerglen,	8 cts. for earth, 50 cts. for rock,	
							per cub. yd. and \$100 for grubbing.	
					Bridge across road	John Scott,	\$ 35	
					on section No. 104,			
					2 culverts across	Burns & Black,	75	
					road on sect. No. 106,			

from 1st Nov. 1826, to 1st Nov. 1827.

enter Names of Contractors.	Price per Perch.
William Bradley, Rick Cassady, n Scott, ry & Love, per Barclay,	\$ 2 25 2 50 1 70 2 50 2 25
ch Jones,	1 00
Barron & Lathrop, shburn, Bronson & Co.	\$100,000 to complete same. 2 94, per perch,
eritt & Crawford, jamin Vandignft,	\$150, for each, 150, for each,

Price per Cubic Yard.



from 1st Nov. 1826, to 1st Nov. 1827.

enter	Names of Contractors.	Price per Perch.
	William Bradley, Rick Cassady, n Scott, ry & Love, per Barclay,	\$ 2 25 2 50 1 70 2 50 2 25
	och Jones,	1 00
	Barron & Lathrop, shburn, Bronson & Co.	\$100,000 to complete same. 2 94, per perch,
	eritt & Crawford, jamin Vandignft,	\$150, for each, 150, for each,

Price per Cubic Yard.

of work entered from 1st of November, 1826, to

1st November, 1827, on western division of Pennsylvania Canal, from section No. 1 to 92.

BRIDGE ESTIMATES AND						FOUNDATION OF BRIDGES.						CULVERTS.					
On sections	Contractors names.	Date	Contracts.	Price of Excavation.	Price of embankment per yard.	On sections	Names of contractors.	Date of Contracts.		Price per perch, of stone work.	On sections	Names of contractors.	Date of Contracts.		Price per perch, of stone work.		
61	Robert Dunscaith	1 st th.	1827.		10 cents.	12	Barclay and Chamberlain	14th August, 1827.		\$2 00							
37	David Boyd	14th	ist, 1827.		10 "	23	Robert Braden	28th May, 1827.		2 00							
40	John Shields	12th	, 1827.		9 "	37	Philologerson	13th November, 1827.		2 75							
2	John Shields	10th	ber, 1827.		12½ "	58	Bull and Everitt	11th December, 1827.		2 00							
57	John Pillows	16th	ust, 1827.		12 "	48	John Keen	10th October, 1827.		2 50							
64	James Thompson	18th	post, 1827.		12½ "	49	John Keen	18th August, 1827.		1 25							
49	John Keen	15th	, 1827.		12½ "	57	Barclay and Kenndy	1st September, 1827.		1 75							
33 and 52	George Twecks	12th	y, 1827.		10 and 12½ "	69	Lemuel Castle	18th August, 1827.		1 70							
67	Lemuel Castle	12th	y, 1827.		10 "	73	Bull, Sackett and Everitt	12th November, 1827.		1 49							
59	George W. Martin	14th	y, 1827.		12½ "	75	Bull and Everitt	1st April, 1827.		1 75							
23	Michael M'Dermott	14th	gust, 1827.		12 "	91	Wilson and Taylor	1st November, 1827.		1 75							
75	Aaron Fitzgerald	24th	ember, 1827.		11 "												
29	Joseph Morrison	10th	ber, 1827.	8 cents.	12 "												
38	David Boyd	10th	er, 1827.		10 "		David Leech	12th April, 1827.		\$135							
46	David Boyd	10th	ber, 1827.		11 "		Robert Beatty	20th April, 1827.		187							
83	B. Curry	12th	y, 1827.		10 "		George W. Martin	10th October, 1827.		40							
83	John Miller	10th	ber, 1827.	8 cents.	10 "		Cahoon and McFarlin	1st November, 1827.		137							
4	M'Farland and Lafferty	24th	ber, 1827.		11 "		David Leech	15th November, 1827.		135							
77	Michael M'Dermott	5th	ber, 1827.		10 "												
21	Michael M'Dermott	5th	ber, 1827.		11 "												
86	John Miller	12th	y, 1827.		11 "												
89	John Miller	12th A	y, 1827.		11 "												
	David Leech, excavation of foundation in four bridges			\$65													
	Rock.			Per yard.													
17	Francis Kearns	12th	ember, 1827.	40 cents.													
19	M'Farlan and Vanslyke	8th	ember, 1826.	50 cents.													
76	Riley and Cassidy	12th	ptember, 1827.	52 cents.													
	Price of gravel.			Price of excavating rock.	Price of embankment.												
1	John Shields	\$10	sec. 8 cents.	35 cents.	12½ cents.	5	William Bradley	1st November, 1827.		Price per yard,							
20	John B. Cahoon	\$100	7 "	29 "	9 "	6	Richardson and Thayer	1st November, 1827.		14 cents							
24	James Gallagher	\$3 p	h. 8 "	40 "	11 "	16	Samuel R. Richards	10th May, 1827.		13							
43	Daly and Barrett		7½ "	85 "		37	David Boyd	12th October, 1827.		8							
46	M'Farland and Lafferty		7 "	40 "	10 "	46	M'Farlan and Lafferty	12th June, 1827.		10							
47	John Keen		8 "	40 "	9 "	81	J. B. Cahoon	12th May, 1827.		6							
73	Bull, Sackett & Everitt		6 "	45 "	9 "					2½							
90	Chapman and Case	\$5 f	ec. 12½ "	40 "	10 "												
							Aqueduct over deer creek	John Thayer	9th September, 1827.		14						
							Aqueduct over Squaw run	Daniel Washburn	9th September, 1827.		14						

ence.

5

6

16

37

46

81

ueduc
dee

ueduc
Squav

to the hill slips, which have caused difficulties and expense beyond any thing that could have been reasonably anticipated. Had no greater difficulties presented themselves than those which common experience would point out in making a canal through a steep side hill country, by the margin of a river rising from 2 to 30 feet, the cost would not have exceeded the estimate. But here, no sooner was the face of the bank fairly opened, than the whole mass, as far as the solid front of rock, began to move in, and in some cases added double the amount of excavation to the first standing out, and this composed, in a great measure, of loose rock. In other instances, when we had the advantage of solid rock on one side, the tow path bank has moved off and left the rock bare on the river side. This has made it necessary to move the line entirely clear of this treacherous foundation, and cut the canal out of the rock.

There are other items which have contributed to the cost of the work, which had not been estimated in Mr. Roberts' report of 30th Nov. last. The protection wall amounting to 19,000 perches, the fencing, waste wiers, safety gates, bridges, embankments, water lime, and that part of the canal between the aqueduct at the mouth of Kiskeminetas, and section No. 9, nine chains nearly as expensive work as any we have. The additional work, also, in the aqueduct over the river, to insure the security and permanency of the superstructure, for which it was agreed to give the sum of \$9,500. These are the causes to which must be attributable the increased cost. The expense of the aqueducts, locks and culverts, and of that part of the line where no extraordinary difficulty has occurred, will not exceed the estimate.

Very respectfully, yours.

JAS. D. HARRIS.

No. 5.

Statement of work done, and money paid upon contracts, on the western division of Pennsylvania canal from section No. 1. to 92, up to 10th Nov. 1827.

Amount of excavation of earth in sections				1,043,936 yds.
do.	do.	do.	at Aqueducts	6,878
do.	do.	do.	at Locks	9,413.
do.	do.	do.	at Culverts	5,784
do.	do.	do.	at Waste wiers	287
do.	do.	do.	at Bridges	109
				<hr/>
				1,066,467
Amount of excavation of Rock				238,508

				Yards.
Amount of embankment in sections				367,253
do.	do.	at Aqueducts	1,000	
do.	do.	at Locks	6,906	
do.	do.	at Bridges	21,246	\$96,403

Amount of Mason work at Aqueducts	Perches	
do. do.	13,325	
do. do. at Locks	4,560	Perche
do. do. at Culverts	2,420	20,30
<hr/>		
Amount of protection wall		18,449
<hr/>		
From whole amount of excavation of earth	1,066,467	
Deduct the amount done to 30th Nov. 1826,	288,192	
<hr/>		
Leaves the amount done since 30th Nov. 1826.	778,275	yards
<hr/>		
Whole amount of rock	238,508	
Done to 30th Nov. 1826.	5,839	
<hr/>		
Done since 30th, Nov. 1826.	232,669	yards
<hr/>		
Whole amount of Embankment	396,405	
Done to 30th Nov. 1826.	45, 68	
<hr/>		
Done since 30th Nov. 1826.	350,837	yards
<hr/>		
Cut stone Masonry all done since 30th Nov. 1826	19,905	perches
<hr/>		
Whole amount of protection wall	18,449	do.
Deduct amount done to 30th Nov. 1826	2,437	
<hr/>		
	16,012	perches
<hr/>		
Amount of work done upon the Sections,	£221,150	00
do do Aqueducts,	77,905	48
do do Locks,	17,346	66
do do Culverts,	6,101	22
do do Waste wiers	214	23
do do Bridges,	6,638	92
do do Fence,	£,023	50
do do Roads,	360	00
do do Water lime,	1,950	00
do do Kirkwood's house,	105	00
<hr/>		
	£334,795	01
<hr/>		
Amount paid as follows for work done upon		
Sections, Aqueducts Locks, Culverts, Waste		
wiers, Bridges Fence, Roads, wall for Kirk-		
woods house, Water lime contract.	£305,447	35



DIVISION No. 1.—Total amount of different works on the Kiskeminetaz division of the Pennsylvania canal, agreeably to the contract prices, from section No. 1 to 48 inclusive.

No.	Length in chains.	Contractors names.	Excava. Earth.	Pr.	Emb. of canal.	Pr. per yard.	Excav. Rocks.	Pr. per yard.	Grubbing	Wall p-per	Pr.	Amount of sections.	REMARKS.
1	21	Lebacron and Lathrop	8000	9c.	8300	12c.	4500	45c.	2400			8 3941	
2	21	W. W. Jones	9500	9	1200	12	6400	45	300			4088	
3	21	George Foreman	6000	8	1500	10	4000	45	170			2600	
4	21	James Anderson	3700	7	2040	8	2300	35	100			1534	
5	21	J. and R. Dobbs	7600	7	500	9	4500	44	100			2657	
6	21	Powers, Sacket and Dobbin	9000	8			21,000	38	105			8805	
7	21	Brown and McLaughlin	10,000	8			18,000	30	150			6350	
8	21	McCloskey and Bur	9000	7			11,000	28	100			3810	
9	21	Mahon and Bressin	6800	8	8000	10	800	45	135			1839	
10	21	Richards and Hill	7700	7	2000	9	20	45	80			758	
11	21	" "	7400	7	800	9	6000	45	60			1955	
12	21	" "	6700	7	2000	9	150	45	60			781 50	
13	21	Richards and S. Keiser	6800	8	10,000	11	20	40	80			1732	
14	21	James Sproul	7200	7	400	8	50	50	40			601	Nearly completed.
15	21	M'Farlan and Lafferty	10,000	7			18,000	49	180			9700	
16	21	J. and D. M'Carthy	10,000	7½			15,000	37½	150	500	56	6080	
17	21	Mercer Smith & Co.	11,300	7	2500	9	10,000	36	35			4651	
18	21	Boyd, Bull and Everett	6000	8			14,000	45	150			5310	
19	21	Thompson and Waldo	10,800	6	2700	8	800	50	35			1279	
20	21	Johnston and Everett	6400	7	12,000	9			150			1678	
21	21	William B. Long	8400	6½	80	8	200	50	84			794	
22	21	Thomas Neil	6800	7	1000	10	50	40	90			686	Nearly completed.
23	21	" "	5850	7	2500	10			50			709 50	Nearly completed.
24	21	Daniel Gilmarin	8500	8	10,000	9		45	150			1730	
25	21	" "	4200	6	5200	7½	1800	37½	100			1267	
26	21	M. D. P. McDermott	3000	7	2800	10	2100	40	100			1430	
27	21	Peebles, Patterson and Armstrong	2000	6	2500	11	2000	40	50			1245	
28	21	Philip Haley	4200	6	10,200	8	800	50	75			1563	
29	21	Joseph Ralston	1800	6½	28,000	8			100			2437	
30	21	Peter Duffy	2600	6	9500	9		80	80			1071	
31	21	" "	1,914.50	7	6 38.30	9		60				809 46	Completed.
32	21	Dickey and M'Farland	2100	6	6200	9	100	35½	200			919 50	Nearly completed.
33	21	Cochran and Duncan	1055½	8	809 3½	10			110			1002 21	Completed.
34	21	Bark, M'Laughlin & Co.	2134 3½	6	6 91 1½	11	894	40	90			1289 75	Completed.
35	21	Sullivan and Wylie	3800	8	1750 1½	9	600	50	66			2329	
36	21	Curry, Grant and M'Dermot	4000	7	1500	8½	1500	37½	75			901 25	Nearly completed.
37	21	M'Crea and Irwin	5041 7½	6	1368 1½	6			60			334 59½	Completed.
38	21	" "	140 1½	6	4381 2½	6			36			383 02	Completed.
39	21	Kepple and Culbertson	500	7	6500	9	100	40	90			750	
40	21	" "	800	7	10,000	11	1000	44	80			1676	
41	21	Kenny, Moore and Moore	2000	6 1½	2500	8	600	50	90			726	
42	21	O'Brien, M'Gran and M'Dermott	25 0.14	6½	110.59	7			53			222 07	Completed.
43	21	Stewart, Wallace, and Stewart	3714	8	4538.10	7	200	37½	80			755 79	Completed.
44	21	" "	4500	7	5000	7	1600	36	78-75			1319 75	
45	21	Dodds, Windrum and M'Kee	7600	7	6540	10	800	40	60			1576	
46	21	J. and C. Merrill	2637.27	7	4543.72	10	3	44	150			796 70	Completed.
47	21	Culbertson, M'Kee and Windrum	5000	7½	6150	8	2000	37½	60			1600	
48	21	M'Dermot and Gibby	7500	7	1050	10	1000	50	150			1330	
			49,039 7½		78,123.54		10,297		200				

NOTE.—Walls, puding, pavement &c. not contracted for or enumerated in the foregoing table, or the } subsequent one, will probably amount to

DAM NO. 1.—Leech and Trucks, Contractors.

TOTAL CUBIC YARDS.

Dam complete, at

\$22,000

Excavation of earth, 263,459.37
Excavation of rock, 131,087

GUARD LOCK NO. 1.—Lafferty and M'Mullin, Contractors.

1600 perches of stone work, at \$4 25,
All other items,
4200 rods of fence, estimated at 80 cents per rod,
Lock house, estimated at
Superintendence, contingencies, &c.

\$6800

Embankment, 223,140.14

850

\$360

300

4000

List of towing-path bridges, amount of cost, &c.

No. of section. Location.	Names of Contractors.	Amt. of st. work.	Price per perch.	Wood work complete.	Amt. of excav. of foundatn.	Total cost complete.	REMARKS.
29	Joseph Ralston	120	\$1 62½	\$ 45	\$40	\$280	
30	Estimated	100	1 62½	45	40	247 50	
32	Dickey and M'Farland	90	1 62½	40	40	326	
33	Cochran and Duncan.	119 ½	1 62½	45	293 y 14	280 30½	Finished.
35	John Wylie	140	1 62½	55	25	307 50	
37	Hugh M'Crea	80	1 50	40	40	200	
41	Kenny and Moon	70	1 50	40	30	175	
42	Kelly and Morrow	47 ½	1 50	40	197 y 14.5	141 06	Finished.
43	Stewart, Wallace and Stewart	70	1 50	45	209 y 12½	176 12½	Finished.
45	Windrum and M'Kee	80	1 50	45	50	195	
46	William Kirkwood	81.94	1 50	45	214 y 10	189 31	Finished.
48	Michael M'Dermott	30	1 50	40	10	125	
Total amount completed, \$2542 80							

5. Bridge embankments 3000 yards, estimated 12½ cents per yard, \$375
1. Section No. 21. Bridge embankment 500 yards, Samuel L. Gemison contractor, 14 cents per yard, 70
Guard bank. John Lafferty contractor, 4500 yards, at 14 cents, 630
Fence moved and put up, sections No. 37 and 38, Hugh M'Crea contractor, 64 rods, 4
O'Brien, M'Gran and M'Dermott, section 42, do, 84 rods, at 10 cents, 8 40
Stewart, Wallace and Stewart, section 43, do, 84 rods, at 10 cents, 8 40
Peter Duffy, section No. 30 and 31, do, 8 0
Samuel Everitt, clearing land to be covered by water of dam No. 1, 12½ acres at \$18 per acre, 225

List of Culverts, total cost, &c.

No. of section. Located.	Names of contractors.	Amt of st. work.	Price per perch.	Wood work and foundatn.	Total cost complete.	REMARKS.
No. 4	James Andrews	85 pr.	\$2 50	825	\$237 50	
9	R. and G. Braden	110	2	70 06	290	
13	Richards and Hill	185	2 25	50	468 50	
20	Nathan Waldo	160	2 50	40	440	
28	Philip Haley	50	2 12½	25	131 25	
Amount, \$1567 25						

RECAPITULATION.

Total cost of sections, \$113,713 19
Dam No. 1, 22,000
Guard lock, 7650
Towing-path bridges, 2,542 80
Culverts, 1,567 25
Canal bridges and embankments, 1,271
Removing and putting up fence, 28 80
Clearing, 223
Fence, 3,360
Lock house, 300
Superintendence, contingencies, 4,000
Guard bank, 650

\$158,188 04

4 CANAL BRIDGES.—Niven, Reynolds and Wiley, \$134 each, amount
2 Estimated \$145 each,

\$586
\$80

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2. The second part of the document is a table with several columns. The columns are headed with names and dates, and the rows contain numerical data. The table is organized in a way that suggests it is a record of some kind, possibly a ledger or a list of transactions.

3. The third part of the document is a list of names and dates, arranged in two columns. The names are written in a cursive hand, and the dates are in a more formal, printed style. The list appears to be a record of some kind, possibly a ledger or a list of transactions.

4. The fourth part of the document is a table with several columns. The columns are headed with names and dates, and the rows contain numerical data. The table is organized in a way that suggests it is a record of some kind, possibly a ledger or a list of transactions.

5. The fifth part of the document is a list of names and dates, arranged in two columns. The names are written in a cursive hand, and the dates are in a more formal, printed style. The list appears to be a record of some kind, possibly a ledger or a list of transactions.

6. The sixth part of the document is a table with several columns. The columns are headed with names and dates, and the rows contain numerical data. The table is organized in a way that suggests it is a record of some kind, possibly a ledger or a list of transactions.

7. The seventh part of the document is a list of names and dates, arranged in two columns. The names are written in a cursive hand, and the dates are in a more formal, printed style. The list appears to be a record of some kind, possibly a ledger or a list of transactions.

8. The eighth part of the document is a table with several columns. The columns are headed with names and dates, and the rows contain numerical data. The table is organized in a way that suggests it is a record of some kind, possibly a ledger or a list of transactions.

9. The ninth part of the document is a list of names and dates, arranged in two columns. The names are written in a cursive hand, and the dates are in a more formal, printed style. The list appears to be a record of some kind, possibly a ledger or a list of transactions.

10. The tenth part of the document is a table with several columns. The columns are headed with names and dates, and the rows contain numerical data. The table is organized in a way that suggests it is a record of some kind, possibly a ledger or a list of transactions.



DIVISION No. 2.—Total amount of different works on the Kiskiminetas division of the Pennsylvania canal, agreeably to the contract prices, from section 49 to 123, inclusive.

No.	Length in chns.	Contractors names.	Excav. Earth.	Pr.p yard canal.	Emb. of yard rocks.	Pr.p Excav. yard rocks.	Pr.p Grubbing amount of yard sections.	REMARKS.					
49	51	Henry Null	11,778	7	310	9	\$ 40	\$ 859 36					
50	do	Glenn, Kuhn and South	10,000	6½	3400	8	200	1374 60					
51	do	John Moore	3800	8	5000	8	120	834					
52	40	Alexander Sprull	5721	6½	150	5	30	150	536 75½	Completed.			
53	24	M'Glade and M'Bride	14,000	6	3600	7	6000	30	60	2910			
54	18	Miltigan, M'Cutchen and Rowley	1970	7	4320	8	5286	45	126	2487 20			
55	21	M'Glade & Co.	1200	7	9500	10	30	30	189	1289			
56	do	E. and W. Divia	6450	6	2800	6	30	30	594		Nearly completed.		
57	do	Mann Boner	4000	6½	3600	8	25	30	439 50				
58	do	Couch, Linn Couch	4700	6½	3600	8	20	49	15	618 30			
59	do	M'Millen, Peacock & Co.	9300	8	5400	11	3300	40	80	2095			
60	do	Do. do.	11,100	8½	2800	43	130	2413 50					
61	do	Bond and Duffy	7000	6½	3000	7½	5000	48	175	2347 50			
62	do	Parpoint, Morrison & Co.	9000	6	2500	6	6000	40	42	5132			
63	do	Thayer and Bills	8200	8	4500	10	3300	40	100	2366			
64	do	Hickenlooser and Johnston	1000	6	11,000	10	420	50	50	1420	Slack water commenced.		
65	do	Do. do.	1400	6½	12,000	9	600	40	80	1431			
66	do	Do. do.	3200	6½	7600	9	80	918					
67	do	Do. do.	800	6½	10,000	9	600	40	80	1372			
68	do	Do. do.	4300	7	2000	9	2600	45	80	1731			
69	do	Do. do.	4300	7	3000	9	1000	50	80	1144			
70	do	Do. do.	6000	7	2000	9	2000	50	80	1680			
71	do	Do. do.	3040	7	9000	7	1180	30	50	1236 80			
72	do	Do. do.	3300	7	4200	7	500	30	50	718			
73	do	Do. do.	5000	7	3200	8	1600	30	75	1161			
74	do	Hickenlooser, Shields & Co.	4900	8	5000	10	5300	40	50	1990			
75	do	Bogle and Wilson	5670	7	1800	9	1000	40	50	1004	Nearly completed.		
76	do	Do. do.	5700	7	6500	9	1200	40	50	1304			
77	do	Do. do.	1000	5	8000	6½	700	31	7	778			
78	do	Do. do.	453	5	7049	6½	413	31	7	701 61	Extra clearing and paving included. Nearly com.		
79	42	Lyons and Hyser	9200	6½	6300	7½	6500	37½	70	3613 75			
80	do	Estimated	4700	9	2800	12½	1305	45	160	1475 25			
81	do	Estimated	5185	9	850	12½	565	45	160	987 15			
82	do	Warren, Sullivan and Jokin	5600	6½	5000	8	550	34	168	1093			
83	do	Philip Haley	5000	6	1500	8	1600	50	180	1468			
84	do	Hugh M'Crea	5500	7	200	9	5000	40	156	1829	Slack water ends.		
85	do	Joseph Moore	24,000	6½	2800	7	200	30	90	1906			
86	do	Peelies and Patterson	12,700	6	5500	8	40	130	1092				
87	do	James Speer, Jr.	12,600	7½	4000	9	6000	39	252	3697			
88	do	Do. do.	13,000	8	12,000	10	100	40	40	2320			
89	41	Leech, Dickey and M'Farland	10,000	7	1000	9	2800	39	300	2142			
90	42	Estimated	13,100	9	7800	10	6000	40	230	4745			
91	do	Estimated	10,000	8	200	12	400	50	80	1104			
92	do	Joseph Black	17,100	8	2300	11	15,000	55	340	7233			
93	do	Cochran and Duncan	7800	8	1500	12	7000	50	200	3104			
94	do	Thomas Johnston & Co.	11,000	9	2500	12	1450	45	55	3010			
95	do	Crandall, Carlton and Case	7800	8	4000	10	40	40	50	1254			
96	45	Culbertson and Cochran	8800	7½	1800	9	400	30	42	974			
97	do	Wallace and Stewart	17,000	7½	4500	9	12,000	31½	200	5650			
98	do	Drammond and Love	7000	8	5000	10	500	45	140	1425			
99	do	Boyd and Long	10,000	7	1200	9	40	25	833				
100	do	Kelly, McIlwaine & Co.	12,800	7	1800	8	37½	240	1280				
101	do	William Bradley	10,500	7	6800	7	80	37	50	1261			
102	do	Hugh Curran	8800	8	800	9	350	38	100	1009			
103	do	Vartin and Keener	14,100	7	600	9	2000	29	150	1771			
104	do	Stewart, Neill and Stewart			section per	contr.							
105	do	Vountain and Stewart	3600	8	7200	10½	1 00	35	175	1940	Slack water commenced.		
106	do	Work and Conway	900	9	5 00	10	4500	25	252	8858			
107	do	Michael M'Dermott	5 00	6	7200	9	1250	40	1 18	1602			
108	42	Estimated	12,500	8	100	12	480	45	175	777 80	Slack water ends.		
109	48	Estimated	12,500	8	1700	12	1200	45	340	2184			
110	do	Gallagher, Merrill and Dixon	11,100	7	650	10	620	44	200	1314 80			
111	do	Do. do.	19,800	8	1100	10	2500	45	200	3919	1400 50		
112	do	Brown and Sawyer	7000	9	6000	10	18,000	30	210	7935	3000 55		
113	do	Estimated	9000	10	5000	12	200	50	240	1860			
114	do	J. and D. M'Vey	12,800	7	50	10	250	30	116	7			
115	43	Caod and Johnston	12,000	6	8	8	20	31	80	806 20			
			339,740		104,880		91,570		275,602 60				
116	42	M'Names and M'Quaid			7000	7	15,000	10	4800	40	800	4830	1800 40
117	do	Raferty, M'Quaid & Co.	8800	6½	2700	8	1600	40	134	1458 50	250 30		
118	do	M'Farland and Lavery	1800	6	19,800	8	15,000	40	250	9192	3800		
119	do	Blain and Kretzer	9000	6	4500	8	1800	35	50	1392			
120	do	Bares, Beardsly and Lemmon	7500	8	320	10	300	28	50	772			
121	do	Blakely and Lewia	10,500	6	1200	7	40	300	856				
122	do	Bradley and Bonner	8800	6	1200	7	40	140	752				
123	do	Do. do.	12,400	6	11,500	6	200	40	140	1710	Slack water.		
			66,300		26,090		23,600						
		Protection wall and other items, puddling, &c. not contracted for, -							11,700				
		Amount,							832,763 50				

[PAGE 59.]

DIVISION No. 2.—Total amount of difference

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1. The first part of the document is a letter from the President of the United States to the Congress, dated January 1, 1801. It is a formal address, and it begins with the words "I have the honor to acknowledge the receipt of your letter of the 28th inst. and in reply to inform you that the same has been forwarded to the proper authorities for their consideration." The letter then goes on to discuss the state of the Union and the progress of the government.

[PAGE 59.]

DIVISION No. 2.—Total amount of difference con

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DIVISION No. 2.—Continued. Total cost of locks on the Kiskeminetia Pennsylvania canal, per contract price—all extra items added.

No. and names of Locks.	Lift of lock ft.	Contractors names.	Per. of st. wrk.	Prices per perch.	Amt. of all extra items.	Total cost.
		Amount done before forfeiture	4 7	84	\$1354 20	
Lift	1	Brown and Sawyer	1100	4 50	500	\$6577 20
	2	Messrs. Smith and Dagal	925	5 98	550	4551 50
	3	Leslie and McCall	925	4 50	1000	5122 50
Guard	2	Thayer and Bults	1550	4 50	1250	8225
Do. 3 and lift 4	5	M'Farlan and Cahoon	2900	3 64	1450	9458
Lift	6	Wallace, Wyndman and Co.	1400	3 93½	1000	6312 50
	7	Joha Moore	925	4	700	4400
	8	Conrad and Hyndman	860	3 87	850	4178
	9	Drem & Co.	860	4	900	4340
	10	Johnston, Jones & Co.	860	4	780	4320
	11	Kenny, Walker and Roberts	1000	3 87½	775	4650
	12	Wilkinson, Keene, Miller and Nesbitt	730	4	720	3600
	13	Sanger and Ingerson	1400	4 10	1000	6740
	14	Merrill, Dickson & Co.	1060	4 20	780	4980
	15	George W. Trout	1000	3 93½	840	4737
	16	Lafferty and M'Mullin	925	3 96	750	4413
Guard	3	Barne, Beardsly, Jones & Co.	780	4 25	680	3740
	6	Brown and Sawyer	1250	3 75	600	5480 50
						\$97,952 70

List of towing path bridges, total cost, &c.

Section Where Names of contractors located.	Perch. of stone work.	Price pr. perch.	Pr. of foundn.	Cost of bridge complete.	REMARKS.
63 Stoops	170	1 50	\$100	\$385	Upper part of the wood work let to H. Gerrett, for \$75.
64 Estimated	60	1 62½	40	20	187 50
66 Estimated	62	1 50	45	20	158
69 Estimated	70	1 50	45	25	175
70 Estimated	80	1 50	45	25	190
72 Estimated	80	1 50	55	30	205
76 Estimated	70	1 50	45	25	175
Total cost, \$1445 50					
Amount paid,					
Amount remaining,					

List of culverts, total cost, &c.

Section Where Names of contractors located.	Perch. of stone work.	Price pr. perch.	Pr. of foundn.	Amt. of culvert.
50 Henry Null	77.61	2 25	93 99	273 54
55 John M'Glen	130	2 12½	100	353
57 Thomas Bower	89	2	180	340
				\$968 54
Amount paid,				
Amount remaining,				

List of contracts for bridges.

No. of bridges contract	Names of contractors.	Price of each bridge.	Amt. of each contract.
2	John Borge	\$150	\$300
2	Piper and Blair	145	290
1	Estimate	145	145
Amount,		\$695	

RECAPITULATION.—Division No. 2.

Amount of sections,	8158,121 98½	Amount made by Mr. Olmstead, from the middle of the 31st, to the end of the 34th mile, as estimated.
Amount of tunnel dam No. 4, &c.	30,000	
Do. aqueduct,	33,325	
Locks,	97,952 70	
Dams,	27,093 60	Canal, aqueducts, culverts, &c.
Culverts,	4,668 54	142 feet lockage, at \$60 per foot,
Towing path bridges,	2,445 30	12,000 rods of fence, at 75 cents,
Canal bridges and embankments,	6,032 50	20 road and farm bridges, at \$250,
Lock houses,	4,800	
Fence,	10,240	
Superintending, contingencies, &c.	20,000	10 per cent. added for contingencies,
Total amount, \$394,601 21½		Division No. 2.—Present probable amount.
Amount of whole line, \$332,789 86½		Difference saved,
Division No. 1,		\$61,811 35½

Having had considerable of an acquaintance with the nature of the ground upon this line, I feel assured that the foregoing estimate of excavation of earth, rock embankment, &c. will not be exceeded in the final result; and that the expenditures will be brought within the estimate.

ALONZO LIVERMORE, Engineer.

(3.)

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No. 6.

Statement of the work done and money paid on Pine creek line of the western division of the Pennsylvania canal, from the commencement to the 20th of November, 1827.

Amount of excavation of earth in sections,	148,771 yds.
do. do. do. at aqueduct,	1,738
do. do. do. at locks,	21,407
do. do. do. at culverts,	1,867
do. do. do. at tunnel contract	21,950
	<hr/> 195,738
Amount of excavation of rock in sections,	10,167
do. do. do. at tunnel job,	7,560
	<hr/> 17,727
Amount of embankment in sections,	130,100
do. do. at locks,	6,478
do. do. at tunnel contract	12,200
	<hr/> 148,778
Amount of mason work at aqueduct,	1517
do. do. locks,	3,811 perches.
do. do. culverts,	756
	<hr/> 6,084
Amount of protection wall,	1,070
Amount of stone work at pier head,	254
Amount of stone work at bridge,	394
Amount of work done on sections,	\$ 31,709 96
do. do. at aqueducts,	7,123 97
do. do. at locks,	21,182 17
do. do. at pier head, &c.	6,587 14
do. do. at culverts,	2,274 00
do. do. at bridges,	1,496 12
do. do. at tunnel contract,	7,000 00
	<hr/> \$77,373 36

Amount paid as follows on sections,

For grubbing, excavation and embankment,	\$25,641 37
Drains, &c.	333 00
Bridge embankments,	225 00
Locks,	19,393 00
Culverts,	2,026 00
Pier head and harbour,	4,900 00
Aqueducts over piers,	6,990 00
Slope walls,	900 00
Turnpike road, (state road)	1,474 00
Tunnel contract,	6,000 00
	<hr/> \$67,882 37

No. 8.

Statement of work done and money paid on Kiskeminetas division from section No. 1 to 78, from the commencement to 10th of December, 1827.

Amount of excavation of earth in sections,	245,724 yards.
do. do. do. in lock pit,	12,064
do. do. do. in culverts,	1,187
do. do. do. in foundation of towing path bridges,	1,261
	<hr/> 260,236
Amount of excavation of rock in sections,	90,708
do. do. do. in lock pits,	3,652
do. do. do. in culverts,	242
	<hr/> 94,602
Amount of embankment in sections,	145,151
do. do. at locks,	700
do. do. at slope wall,	1,028
do. do. at bridges,	656
	<hr/> 147,535
Amount of mason work in locks,	4,120 perches
do. do. do. in culverts,	398
do. do. do. in towing path bridges,	752
	<hr/> 5,270
Amount of slope wall and pavement,	2,879
Amount of work done upon sections,	72,781 07½
do. do. locks,	21,498 80½
do. do. culverts,	1,533 44½
do. do. dams,	22,151 00
do. do. slope wall and pavement,	2,305 43
do. do. towing path bridges,	1,682 30
do. do. roads,	143 00
do. do. bridge embankments,	75 84
do. do. removing fences off the line of canal,	28 80
do. do. in clearing & chopping Hawk's Island and Parks' Island,	225 00
	<hr/>
Whole amount of work done,	\$ 122,723 69
Amounts paid as follows:	
For excavation, embankment and grubbing,	\$66,560 70½
Locks,	21,063 00
Culverts,	1,045 00
Dams,	20,220 00
Slope wall and pavement,	2,454 85
Towing path bridges	1,576 80
Roads,	136 00
Bridge embankments,	65 00
Removing fences,	28 80
Clearing and chopping Hawk's Island, &c.	140 00
	<hr/>
	\$ 113,290 15½

LIST OF ENGINEERS, Assistant Engineers, and subalterns employed in the Engineer Department, from Kiskiminnietus to Pittsburg, since the last report.

NAMES.	Capacity served in.	Length of time served.	Pay		
Nathan S. Roberts	Principal engineer	3 mo. 17 days	\$3000 per an.	ending May 31, 1827	\$889 72
Do.	do.	1 mo. 7 days	\$2000 do.	ending 7th July, 1827	205 02
James D. Harris	Assistant engineer	143 days	\$3 per day	ending 3d May.	429 00
Do.	Engineer	2 quarters	\$1460 per an.	ending 3d Nov.	730 00
Atlas E. Lacock	Assistant engineer	129 days	\$1 70	ending 9th May	219 30
Do.	do.	195	2 00	ending 20th Nov.	390 00
Andrew D. Harris	do.	119	1 70	ending 9th May	202 00
Do.	do.	195	2 00	ending 20th Nov.	390 00
David K. Bishop	do.	15	2 00	ending 16th August	30 00
Francis Reno	do.	127	2 00	ending 20th Nov.	254 00
Magnus M. Murray	Surveyor	11	3 00	ending 2d April	33 00
William B. Foster, jr.	do.	11	3 00	ending 28th April	33 00
Caleb A. Alexander	do.	15	2 00	ending 9th August	30 00
William B. Foster, jr.	Rodman	163	1 50	ending 19th May	244 50
Charles Randolph	do.	8	1 50	ending 27th April	12 00
David K. Bishop	do.	88	1 50	ending 1st August	132 00
Francis Reno	do.	93	1 50	ending 16th Aug.	139 50
Wiklins M'Nair	do.	147	1 50	ending 20th Nov.	220 50
Caleb A. Alexander	do.	112	1 50	ending 20th Nov.	168 00
James Robinson	do.	142	1 50	ending 20th Nov.	213 00

LIST (Continued.)

NAMES.	Capacity served in.	Length of time served	Pay.	
George Keen	Rodman	10 days	\$ 1 50	ending Sept. 25, 1877
John Kelly	Axe man	157	1 00	ending -1st Aug.
William Shechy	do.	297	1 00	ending 20th Nov.
Edward Shechy	do.	80	1 00	ending 20th Nov.
James Crane	do.	9	1 00	ending 16th Aug.
Samuel Borland	do.	72	1 00	ending 13th Nov.
Wilkins M'Nair	do.	37	1 00	ending 26th June
Thomas P. Enoch	Chainman	20	1 00	ending 26th April
Michael Kennedy	do.	8	1 00	ending 26th April
R. L. Keen, Clerk, \$2 00 per day.				
				\$ 15 00
				157 00
				297 00
				80 00
				9 00
				72 00
				37 00
				20 00
				8 00

The foregoing is a list of the engineers, assistant engineers, surveyors, rodmen, axemen and chainmen, who have been employed in the engineer department, from Kiskeminnetas to Pittsburg, since the last report, with the length of time served by each person in his respective capacity.

Very respectfully, yours,

JAS. D. HARRIS, *Engineer.*

ABNER LACOCK, Esq. *Acting Commissioner.*

20th November, 1827.

SIR—I herewith transmit a detailed statement of the names of persons employed in the engineer department, on the Kiskeminetas division of the canal line, their several capacities, term of service up to the present date, and rate of wages, at which each has been employed.

I have the honor to be your obedient servant,

ALONZO LIVERMORE, *Engineer.*

A. LACOCK, Esq. *Acting Commissioner.*

LIST of persons employed in the Engineer Department on the Kiskeminetas Division of the Pennsylvania Canal, A. D. 1827, with the wages of each.

Alonzo Livermore, Engineer, \$1460 per annum, 2 quarters, paid.

NAMES.	Capacity	When commenced	Entering	No. of days	Wages per day	TOTAL.
Wm. B. Foster, Jr.	Assist, Engineer	May 20th	Dec. 5th	200	\$ 2	\$ 400
Theophilus Williams	do. and surveyor	May 20th	Dec. 5	200	2	400
D. K. Bishop	do. engineer	Sept: 1st	Dec. 5	96	2	192
Michael Kennedy	do. and surveyor	Sept: 1st	Dec. 5	96	2	192
James Callan	draftsman	Nov: 19	Dec. 5	17	2	34
Thomas P. Enoch	rodman	May 20	Dec. 5	200	1 50	300
C: H: Randolph	do:	June 26	Dec. 5	163	1 50	244 50
J: B: Miles	do:	July 2	Dec. 5	157	1 50	235 50
James Day	do:	Sept. 10	Dec. 5	87	1 50	130 50
G: R: Eichbaum	do:	Sept. 10	Dec. 5	87	1 50	130 50

LIST (Continued.)

NAMES.	Capacity	When commenced	Entering	No. of days	Wages per day	TOTAL.
E. R. Livermore	rodman	May 20	Dec. 2	200	1 50	\$ 300 00
Michael Kennedy	axeman	May 21	Aug. 31	89	1 00	89 00
C. H. Randolph	chainman	May 21	June 25	31	1 00	31 00
James Robinson	do	May 21	July 1	36	1 00	36 00
James McLaughlin	axeman	May 28	Dec. 5	165	1 00	165 00
William Hickenlooser	do	Sept. 6	Dec. 5	79	1 00	79 00
Samuel M. Porter	chainman	Sept. 10	Oct. 26	40	1 00	40 00
Edward Day	ch'n. & axeman	Sept. 13	Dec. 5	73	1 00	73 00
James Campbell	axeman	Sept. 9	Oct. 10	26	1 00	26 00
William Moore	do	Sept. 19	Oct. 23	30	1 00	30 00
William Moore	do	Nov. 12	Dec. 5	21	1 00	21 00
James R. Forter	do	Sept. 24	Oct. 6	12	1 00	12 00
James G. Brown	do	Oct. 6	Dec. 5	53	1 00	53 00
Alexander Fulton	do	Sept. 12	Dec. 5	73	1 00	73 00
William Hamilton	do	Nov. 12	Nov. 20	8	1 00	8 00
						<u>\$3,295 00</u>

I certify the foregoing to be a correct and full account of all hands employed, and time served in the capacities therein named, respectively, on the Kiskeminetas line, western division of the Pennsylvania canal, under my superintendence up to this date, December 5th, 1827.

ALONZO LIVERMORE, Engineer.

No. 11.

Statement of damages paid by agreement, on Western Division of Pennsylvania Canal, from the commencement to this date.

To whom paid and amount, from section No. 1. to 92.

<i>To whom paid.</i>	<i>Amount paid.</i>
William Henderson;	\$14 00
John Pillow,	15 00
James Speer,	13 75
Robert M'Corkle,	21
John Miller,	30
Daniel Moyers,	2
Henry Kellet,	160
Thomas Speer,	10
Daniel Moyers,	2
Jacob Clink,	20
George Remaily,	20
George M'Clelland,	18
Henry Sutton,	5
Philip Gable,	15
James Scholey,	10
James Stewart,	10
James Bole,	17
Jacob Mangold,	20
Robert W'Corke,	18
Joseph Kissick,	15
John Beatty,	10
William Miley,	3
James M'Kee,	5
Jacob Staly,	8
John Moore,	3
Alexander Stewart,	14
George Leslie,	18
James Blakeley,	20
James Leslie,	20
George Leslie, jr.	13
B. Sweeny,	18

\$573 75

To whom paid and amount, on Pine creek line, from section No. 92 to Pittsburg.

Benjamin Hamilton,	\$12
Henry Rechabaugh,	100
F. Bower,	75
James Kerling,	4
M. Diamond,	16
Andrew Gallagher,	20
Henry Cain,	12

<i>To whom paid.</i>	<i>Amount.</i>
James Power,	\$5
James Armstrong,	2 50
A. M'Cartney,	4
John Renckle,	12
George Thomas,	100
Benjamin Kerr,	300
James Keeling,	1
D. Jones,	5
	<hr/>
	\$668 05
	<hr/>

Amount paid on Kiskeminetas line.

John Wurt,	\$140 00
December 12, 1827.	

ABSTRACT.

Amount paid for damages, from section No. 1 to 92.	\$573 75
do do do No. 92 to Pittsburg,	668 50
do on Kiskeminetas line,	140 00
	<hr/>
Whole amount paid,	\$1382 25
	<hr/>

Damages assessed—none.

No. 12.

*Statement of damages agreed to be paid on the Western Division,
of Pennsylvania Canal.*

George Space,	\$40
A. Kirkwood,	225
Wilson Crawford,	152
Brenaman and Fay,	[300
	<hr/>
	\$717 09
	<hr/>

December 12, 1827.

No. 13

Report of Engineer on the Kiskeminetas division of the Pennsylvania Canal.

To Abner Lacock, Esquire, acting commissioner on the western division of the Pennsylvania canal.

SIR,

In obedience to an act of the general assembly of Pennsylvania, and agreeably to a requisition of the canal board, I have the honor to submit to you a full and detailed statement of the costs for the construction of the canal from the termination of the Kiskeminetas

river, into the Allegheny, to the end of section No. 123, as located and under contract. The items of each contract are enumerated; the aggregate amount the work will have cost when completed, and the contractors names are given. It will also be perceived, that all works, not as yet under contract on this division, I have set down the probable amount for their complete construction. For the purpose of comparing the final cost with former estimates, I have, in the present communication, divided the line committed to my superintendence, into two sections or parts. The first of which I commenced locating at the mouth of the Kiskeminetas, on the 21st day of May last, assisted by William B. Foster, junr. and Theophilus Williams. This location extends no further than the 78th section, and was ready to be put under contract by the 28th of June last.

The whole of the first division is 12 miles and 48 chains; and consists of what was originally called the "feeder line." It was surveyed by judge Roberts, in 1826, but as no estimates made by him, were published in any of the canal reports, I have no data wherewith to compare the contemplated cost herein submitted.

The line commences upon a level with the aqueduct across the Allegheny river, and is about 40 feet above low water mark.—The height of this level above the river being considerably too much of an elevation for the situation of the ground proceeding a distance of five miles up the river, has in a great measure, enhanced the expense of canal navigation along this distance.

At the end of section No. 23, I located a dam 27 feet perpendicular from the bed of the river; the top of which will be two feet above high water line of canal, and is expressly designed to retain the surplus water of the spring freshets as a reserve for any deficiency that might occur in dry seasons, or result from unforeseen providences. The water thus accumulated in the river and detained for contingencies by the two extra feet of elevation in the dam, amounts to 33 millions of cubic feet, or 3300 locks full. This dam furnishes a slack water navigation of six and a half miles, the the remaining distance of the feeder line. A substantial towing path will be constructed along the shore; a considerable part of which is now completed, and all in a certain prospect of being speedily done to my entire satisfaction. I may here state, that the top of the towing path is in no place, less than eight feet above the water line of dam or 14 feet above the bottom of canal. Considering the magnitude of this work, its great utility and the perservance of the contractors to complete their work in a permanent manner, I have no hesitation in saying, that no public work of the kind can, to any extent, be found in the United States, which may be compared to this section of the Pennsylvania canal. It is further premised, that had the dam above mentioned, been located as far up the river as to enable the engineer to reduce the height to 12 feet, the total expense of constructing canal would stand as follows, agreeably to my estimates:

To 12 miles and 48 chains of canal, including all items not enumerated,	}	\$195,866
Dam 12 feet high,		8,000
Guard lock,		6,000
		<hr/>
		\$209,865
Amount of expenses as located,		158,188 04
		<hr/>
Difference in favor of present location,		\$51,676 96

The principal reason why a canal would have been so expensive, had it been adopted in the present instance, is owing to the necessity of having to continue the level without locking. You, sir, will readily perceive that a continued level, which in one situation might afford a proper cutting for a canal, would if extended and adopted as the ground rises with the river, cause an increase in the depth to be excavated, and by consequence augment the amount of labor, costs, &c. The construction of a canal under such circumstances would not only be extremely difficult, but attended with incalculable expense; when if locks could be adopted, should afford canal navigation comparatively cheap. In a word, the situation of the ground along the bottom lands, throughout the foregoing distance, is generally from 12 to 18 feet above the bottom of the feeder line.

The second division embraces a line of 31 miles and 55 chains, and commences at the end of 64th mile as located by Mr. Olmstead, being the end of section No. 48 and terminates at the end of section No. 123, or the 31st mile of Mr. Olmstead's location. This division embraces in the whole distance, four dams; one of 16 feet, two of 17½ feet, and one of 11 feet perpendicular rise above the bed of the river; affording in all 9¾ miles of slack water navigation.—These four dams, including the cost of constructing a substantial towing path along the bank of the river, will have saved the state, agreeably to my calculations, at least \$30,000. But when it is taken into view, that the valuable salt works in operation on the banks of the Kiskeminetas are neither damaged nor removed (which must have been the case had a canal been constructed) then indeed, with all moderation, it can be asserted, that not less than \$50,000 more are saved by the line now under contract; making an aggregate sum of actual saving when compared with former estimates predicated upon canal navigation, equal to \$80,000. The total extent of slack water navigation is 16½ miles.

With respect to that part of the line situate between the 78th section, and terminating "at or near Blairsville," I commenced the location on the 12th of September, assisted by D. K. Bishop and Michael Kennedy. Our labors were performed and the division ready to be put under contract by the 23d day of October last.

No material variation has been made in the course pursued by Mr. Olmstead, until the end of the 43 mile or the 104th section of our present location. From this point, the north side of the river presents but a continued series of difficulties to canal navigation.

The lofty mountains on either side of the river, are literally walls of solid rock. The river winds its way as if at a loss which course to pursue, being interrupted in its meandering by those stupendous, and almost impassible barriers. For some time I was at a loss to conceive what should be done, and after having examined every ravine and valley in the neighbourhood, I availed myself of the local information of the oldest settlers in the vicinity, who, to their credit and patriotism be it spoken, afforded me every possible aid in my examinations. I apprehend it would be doing the citizens of this section of country injustice, not to make this public expression of my acknowledgments, and to say that without reference to sectional or local interests, each appeared willing to sacrifice sordid views on the altar of public good. Happily, however, I discovered a passage, where by crossing the river to the south side and making a *tunnel* of 750 feet in length, through a hill of about 300 feet elevation, I could cut off in distance $2\frac{1}{4}$ miles of the most unfavorable obstacles to canal navigation; and by keeping the south side of the river, to a point "at or near Blairsville," should save the state to the actual amount of \$83,000, on this particular location, according to the contract prices agreed on at the sales in October last. This saving, it is evident is the difference between the survey of Mr. Olmstead, and my estimate, that gentleman having continued his exploring line around the bend of the river. I may further remark that the distance to Blairsville from the mouth of the Kiskeminetas on the north side is 46 miles; and that the present location by the tunnel route to the same place is but $43\frac{3}{4}$ miles.

A few contracts have as yet to be entered into, but in all such cases I have made a liberal estimate. A sum of \$10,000 is added to cover incidental expenses of superintendence, &c.

It remains to take a general view of the whole line under my care and to submit some remarks in relation thereto.—Respecting the actual amount of work done, you have a detailed statement in my last estimates; a correct scedule is annexed, shewing the whole amount of each contract, with the contractors names, &c.

An erroneous idea is somewhat prevalent in this section of country, respecting the interruption of the river trade, in consequence of the erection of the *dams*, above mentioned. Were such the fact, no liberal mind would cavil or reflecting upon the vast importance of the canal to every part of the state, but particularly to this highly favored manufacturing district. Partial and momentary inconveniences ought at all times to give place to general and permanent benefits. Indeed, I must acknowledge, I know of no intelligent citizen, with whom I have conversed on this subject, but has unhesitatingly declared in favor of submitting, all natural advantages towards the completion of the Pennsylvania canal. In the mean time I would respectfully suggest that where persons trading on the river might be anxious to avail themselves of an uninterrupted navigation at the seasons of high water, (should the legislative wisdom of the state deem it advisable,) locks, might be constructed at a moderate expense, adjoining the dams, to communicate immediately with the

channel of the river. But if any part of the state is eventually to be benefitted by the canal, I say without fear of reasonable contradiction, there is none can be more advantaged by its completion than the numerous enterprising manufacturers in this vicinity. When the canal shall be in successful operation, the Kiskeminetas salt merchants will no longer complain of an uncertain facility to a good market, nor will the transient passenger witness thousands of barrels of salt under roof for miles along the river, owing to an uncertain river navigation, besides the innumerable coal pits in this neighbourhood must then become a source of profitable trade to a hardy and honest portion of our citizens. Markets will also be equalized to our farmers and manufacturers to an incalculable extent. And in addition, the surplus water retained by the dams can be converted into a productive *revenue* to the state, by the superabundance of WATER POWER which may be rented to industrious capitalists.

To dwell upon the numerous advantages to be derived from a steady communication between all parts of the state would be superfluous on the present occasion. However, even the completion of the line between Johnstown and Pittsburg, is of itself sufficient to convince every friend to the interests of this state, that Pennsylvania is destined to be the key stone, in the arch of our agricultural and manufacturing confederacy. The majestic forests upon the Chesnut ridge, and Laurel hill, which at present exhibit but an unimproved soil, must by the extension of our canal line, in all probability be the market of supply for timber, staves, &c. to many foreign nations.

Respecting the two dams first put under contract, they were until the middle of October, under a rapid advancement, toward completion; no doubt could be entertained, at that period, but the work of both would be completed, by the stipulated time. But the latter part of October, the whole month of November, and up to the present date, the weather has been unusually unfavorable. The heavy rains, and consequently freshets in the river, have not only retarded the work generally, but the flood that happened upon the 7th day of November, raising the river nearly 10 feet perpendicularly, in a short space of time, did considerable injury, to each of these works, but more especially to dam No. 1.—This flood took off near 200 feet of the north end, that was raised to a considerable height. The actual damage to the contractors, could not be less than 5000. The part of the dam thus injured, would have been in five or six days more of good weather, secured from danger. How far the contractors should be relieved in this case it is not for me to say, but in justice to them, I am free to state that they prosecuted their work with diligence, activity and great energy. Nor did they relax their exertions, in consequence of this disaster, but prosecuted the work with increased vigor, and in two weeks by great exertions and expense, had once more a prospect, of repairing the injury and completing their contract.—At this critical period, a second flood succeeded, as sudden, and of greater magnitude, frustrated their

hopes, and swept away what was placed in the former breach.— Under these circumstances, and especially, as the rain continues, at this time, and the flood is still increasing, I should recommend a suspension, of the work upon the dams, until a more favorable season;—The other contracts, might have been completed by the proper time, but as one part of the line is of no consequence without the whole, it will probably be better to let the contractors do as they think proper in regard to the prosecution of their contracts, during the unfavorable season.

The contractors upon the last letting, have mostly commenced operations a great proportion, of the grubbing has been done, on the different contracts. The contractors of the tunnel, have commenced work; they have excavated to the solid rock, upon each end. Their present prospects are highly favorable.

It can almost be calculated to a certainty, that the canal will be completed to Blairsville, by November, 1828, for this season, in the space of 4 months, although the weather has proved uncommonly unfavorable for canal operations, considerable more than one half the work has been done upon the line first put under contract.

All of which is respectfully submitted,

ALONZO LIVERMORE, *Engineer.*

December 10, 1827.

Series 4.

No. 1.

CANAL OFFICE, *Meadville, November, 16, 1827.*

To the board of Canal Commissioners.

GENTLEMEN:—In compliance with the instructions of the board, the superintendent begs leave to make the following report:—That he put under contract the entire division and French creek feeder for the Pennsylvania canal, directed by law. The letting took place on the 15th day of August last and duplicate contracts were executed as speedily as possible thereafter. One of each contract now transmitted to be deposited in the state treasurer's office, and the other delivered to the party entitled thereto, and a transcript retained for the use of the commissioner.

The contractors were bound to commence working on the several sections of the canal within 30 days from the said 15th of August, which was strictly attended to, and prosecuted with energy and advantage according to the number of labourers engaged, and could be obtained at the time. All the sections on the line are grubbed and cleared with the exception of one which was abandoned and re-let. Some of the sections are nearly finished and others in great forwardness. The length of the line under contract is about 9 miles, and laid off in sections averaging about 80 perches each.

The names of the contractors, together with the amount contracted for, you will find represented in a tabular form, marked (A.) From the estimate of James Ferguson, Esq. engineer, marked (B) the total amount of labor to be performed in the formation of said canal will be found.

The first estimate made by the said engineer of the amount of work actually done by the said contractors, aforesaid, on the several and respective sections of the French creek feeder, and the amount actually expended and paid thereon, reserving the one fifth part as required by law, is fully set forth in the schedule marked (C,) together with a tabular form thereto annexed.

The building of the several culverts fixed on by the engineer on sections 4, 5, 8, 9, 10, 12, 13, 18, 21, 27 and 33, have been contracted for, which are to be built of stone at the following rates:—For the foundation wall, from \$1 50, to \$1 75, per perch of 25 cubic feet. For the parapet wall, from \$2 25, to \$2 50, per perch, and for the arch from \$3 to \$3 50, per perch. And for which large quantities of stone is furnished.

A contract has been made with Henry Bole, George W. King, and Henry Hurst, for making a road south and immediately below Meadville, to supply that part of the turnpike road occupied by the canal at \$740 per mile; the distance one mile and one fourth. Also a contract with Levi L. Morris, of Meadville, to remove his joiner's shop which stood on the line of canal, and agreed to pay

A.

ne of the French creek feeder, Pe
e board, has the honor to state,
nto 35 sections—being a distance

Excavation per cubic yard.

Common.	Rock.	Slate.	
cents.	cents.	cents.	cents.
8½	37	15	13
7	37	18	13
8		28	13
7		25	13
7½	34	14	13
9			13
7	38	29	20
11	39	20	13
9	37	27	13
	37	26	13
	10		

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REPORT OF JOHN PHILLIPS, Superintendent upon the line of the French creek feeder, Pennsylvania canal, to the board of Canal Commissioners.
GENTLEMEN:—The Superintendent, in compliance with a resolution of the board, has the honor to state, that after notice had been given, he put under contract, so much the French creek feeder, as was contemplated in said resolution, divided into 35 sections—being a distance of about nine miles, as appears in the following table:

No. of sections.	Name of Contractors.	Date of Contracts.	Excavation per cubic yard.				Estimate of cost per cubic yard.	Putting in per cubic yard.	Mud per perch on outside of canal.	Grubbing.
			Common.	Rock.	Side.	Hardpan.				
1	James Brawley,	August 20 1827	cents. 8½	37	15	13	cents. 5	cents. 5		\$ 250 for section.
2	Henry Colt,	21	7	37	18	15	Est. Eng.			220
3	Alexander Shaw,		8		28	18	11			100
4	Albert E. Bull,		7		25	15	15			120
5	Arthur Cullum, James Dickson and Warren Payson,	21	7½	34	14	13	9	5		150
6	John Masters,	20	9		29	17	10			75
7	Ira Avery and Alexander M'Claskey,	22	7	38	20	20	10			120
8	Arthur Cullum,	21	11	39	20	14	13			210
9	Samuel Haroon,	21	9	37	27	17	10			144
10	Elliot Haroon,	21	8	37	26	17	10			105
11	Henry Hurst,	November 1-	8	10	36	25	12½			120
12	Albert E. Bull,	21	8		25	16	11			190
13	Albert E. Bull,	21	8		27	17	9			95
14	Daniel Smith,	September 3	10		28	16	11			110
15	David Compton,	August 28	9	45	28	17	10			60
16	Alva Barr and Alexander M'Claskey,	28	7	38	28	17	10			25
17	Levi Cox,	28	9	37½	18	16	10			100
18	John J. Lyons,	28	6½	36½	27	9	7½	11	80	150
19	Alexander M'Claskey and Alva Barr,	28	8	38	18	25	10			160
20	John Radle,	28	7	56½	20		8	12	1 15	90
21	Arthur Cullum, James Dickson and Warren Payson,	31	9	51	25	18	9	5		50
22	William Dickson and James Dickson, jun.	20	9	45	12	18		Estimate Engineer.		60
23	Harry Malloy, Silas Harris, Jonathan Spalding, R. W. Sherman, John S. Sherman and Stephen B. Martindale,	22	8	48	25	12	10	18		70
24	Same company,	22	8	48	12	12	10			55
25	Cooper Barclay, John Bartley, and Wm. Latta,	20	6½	35	12	9	10			50
26	George Hurst and Henry Hurst,	September 5	7	30	12½	12	10			30
27	Arthur Cullum, James Dickson and Warren Payson,	August 21	8	25	13	14	9	5		
28	Albert E. Bull,	22	9		22	15	10			
29	Jared Shattuck, William Magan and Albert E. Bull,	September 20	8		22	19	10			7
30	Thomas King,	August 21	8	50	25	15	9			30
31	Cooper Barclay, John Bartley and Wm. Latta,	20	7	37½	12½	12	6	15		40
32	Thomas King,	21	8	50	25	15	9	6	1 50	90
										81 75 wall per perch on inner side of canal, & 50 c. for every p. in the wall not found on the ground.
										1 30 grubbing for sect.
33	Robert Mead,	20	10½	75	20	18½	18½	8	1 75	\$ 180 for section.
34	Hugh Brawley and Hugh M'Dill,	20	10	50	14	14	13	12	1 00	150
35	Alexander M'Claskey and Alva Barr,	28	7	45	10	15	8	12		130

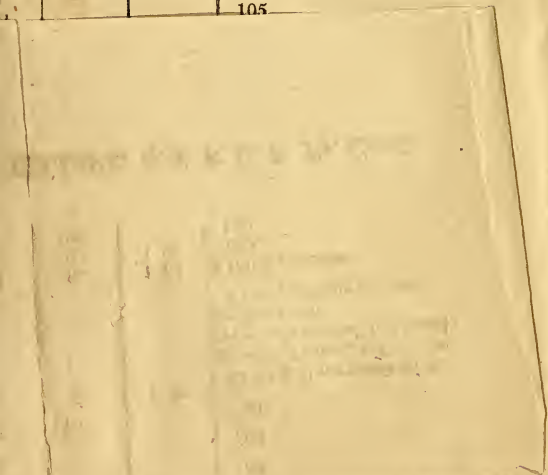
Respectfully submitted,

Canal Office, Meadville, Nov. 18, 1827.

JOHN PHILLIPS, S. I. F. C. F. Pa. Canal.

at canal, to the board of Canal Commissioners; notice had been given, he put under contract, so much as nine miles, as appears in the following table:

Embarkment ats.	Puddling per cubic yard cents.	Wall per perch on outside of canal. cents.	Grubbing:
			\$ 250 for section.
	5		220
Est. Eng.			100
			120
	5		150
			75
			120
			210
			144
			105



granted which stood on the side of canal, and agreed to pay

him the sum of \$28. Also a contract with John Crosby to remove a log barn, standing on the line of canal, for the sum of \$5, and also, a contract with Artemas Smith to remove his fence included in the line of canal, and to pay him the sum of \$3 therefor.

The road and farm bridges will be put under contract in a short time, to give contractors an opportunity to procure materials this winter. The whole of the work contracted for is to be completed before the 1st day of August, 1828. The number of hands employed on the canal in October, were about 700. Since that time a less number are engaged in consequence of wet weather.

The contracts are generally below the price or estimate fixed by the engineer. The following deviations will appear.—The grubbing on section No. 23, was contracted for at the estimate of the engineer, and upon his re-estimate, the allowance reduced, which contract I am not at liberty to alter. On section 32, the 50 cents for stone not found on the ground was agreed to in consequence of the great distance and difficulty to procure the same. On section 33, the bidder was the owner of the land, (and owners were generally preferred) and being a good contractor, the allowance of twelve and one half cents was given for excavation, the estimate being eleven cents.

A list of engineers, &c. required will be put off for some time, in consequence of the absence of the engineer, and the want of a full report from him.

The report obtained from the engineer, upon the work under his charge, together with an estimate of its cost based upon the actual contract prices, is also forwarded.

Respectfully submitted,

JOHN PHILLIPS,
Superintendent French creek Feeder.

B.

Estimate of the quantity of work done on the several sections of the French creek feeder, as reported by J. Ferguson, engineer, together with the payments made thereon.

1. James Brawley, Grubbing, \$250, $\frac{7}{8}$ done	
\$218 75, dist. $\frac{1}{5}$,	\$175 00
Excavation 1377 c yds. 8 $\frac{1}{2}$	
cents, $\frac{1}{5}$,	93 64
Solid rock 265 c yds. 37	
cents, dist. $\frac{1}{5}$,	78 44
	<hr/> \$347 08
2. Henry Colt, Grubbing, \$220, $\frac{5}{6}$ done \$183 34,	
dist $\frac{1}{5}$,	\$146 68
Excavation 451 c yds. 7 cts, dist $\frac{1}{5}$,	25 25
Solid rock 72 c yds. 37 $\frac{1}{2}$ cts, dist $\frac{1}{5}$,	21 32
Slope wall 123 per. $\frac{5}{10}$ \$1 50, dist $\frac{1}{5}$,	148 20
Drain,	\$12, dist $\frac{1}{5}$, 9 60
	<hr/> \$351 05

3. Alexander Shaw, Grubbing \$100, dist $\frac{1}{5}$,	\$80
Excavation 1504.4 c yds 8 cts	
dist $\frac{1}{5}$,	96 28
Embankment, 153 c yds 11 cts $\frac{1}{5}$,	13 47
	<hr/> \$189 75
4. Albert E. Bull, Grubbing \$120, $\frac{4}{5}$ done \$96,	
dist $\frac{1}{5}$,	\$76 80
	<hr/> \$76 80
5. Arthur Collum, James Dickson, and Warren Payson, Grubbing \$150, dist $\frac{1}{5}$,	\$120 00
	<hr/> \$120
6. John Masters, Grubbing \$75, $\frac{5}{6}$ done \$62 50,	
dist $\frac{1}{5}$,	\$50
Excavation 1169 c yds, 9 cts dist $\frac{1}{5}$,	84 17
	<hr/> \$134 17
7. Ira Avery and Alexander M'Claskey,	
Grubbing \$120, dist $\frac{1}{5}$,	\$96
Excavation 2273 c yds 7 cts dist $\frac{1}{5}$,	127 28
Embankment 345 c yds 10 cts dist $\frac{1}{5}$,	27 60
	<hr/> \$250 88
8. Arthur Cullum, Grubbing \$210, $\frac{6}{8}$ done	
\$175 50, dist $\frac{1}{5}$,	\$126
Excavation 596 c yds 91 cts,	
dist $\frac{1}{5}$,	52 45
	<hr/> \$178 45
9. Samuel Harroon, Grubbing \$144, $\frac{3}{9}$ done	
\$128, dist $\frac{1}{5}$,	\$102 40
Excavation 529 c yds 9 cts,	
dist $\frac{1}{5}$,	38 9
	<hr/> \$140 49
10. Elliott Harroon, Grubbing \$105, dist $\frac{1}{5}$,	\$84
Excavation 1080 yds 8 cts, dist $\frac{1}{5}$,	65 92
	<hr/> \$149 92
11. Henry Hurst, Grubbing \$120, $\frac{3}{4}$ done \$90	
dist $\frac{1}{5}$,	\$72
	<hr/> \$72
12. Albert E Bull, Grubbing \$190, $\frac{8}{10}$ done	
\$152 dist $\frac{1}{5}$,	\$121 60
Excavation 1266 c yds	
8 cts, dist $\frac{1}{5}$,	81 02
	<hr/> \$202 62
13. Albert E. Bull, Grubbing \$95, $\frac{4}{5}$ done \$76,	
dist $\frac{1}{5}$,	\$60 80
Excavation 962 c yds, 8 cts,	
dist $\frac{1}{5}$,	61 57
	<hr/> \$122 37
14. Daniel Smith, Grubbing \$110, $\frac{5}{7}$ done \$78	
58, dist $\frac{1}{5}$,	\$62 86
Excavation 504 c yds 10 cts,	
dist $\frac{1}{5}$,	40 32
	<hr/> \$103 18

15. David Compton, Grubbing, \$60, dist $\frac{1}{2}$, \$48
Excavation 664.2 yds 9 cts dist 1-5, 47 82
————— \$95 82
16. Alexander M'Claskey and Alva Barr,
Grubbing \$25, half done \$12 50, dist 1-5, \$10
————— \$245 89
17. Levi Cox, Grubbing \$100, dist 1-5, 80
Excavation 2304 c yds 9 cts, dist 1-5, 165 39
18. John J. Lyons, Grubbing \$150, dist 1-5, \$120
Excavation 2720 c yds $6\frac{1}{4}$
cts, dist 1-5, 136
Embankment 410 c yds $7\frac{1}{2}$
cts, dist 1-5, 24 60
Extra labour, \$70, dist 1-5, 56
————— \$336 60
19. Alexander M'Claskey and Alva Barr,
Grubbing \$160, $\frac{1}{16}$ done \$16, dist 1-5, \$12 80
————— \$12 80
20. John Raddle, Grubbing \$90, dist 1-5, \$72
Excavation 4414 c yds 7 cts,
dist 1-5, 247 18
Solid rock 20 yds $56\frac{1}{4}$ cts, dist 1-5, 9
Allowance for removing timber
\$115, dist 1-5, 92
————— \$420 18
21. Arthur Cullum, Jas. Dickson and Warren
Payson, Grubbing \$50, dist 1-5, \$40
Excavation 4123 c yds 9 cts dist 1-5, 296 85
Allowance extra \$16, dist 1-5, 36 80
Embankment 120 c yds 9 c cts, dist 1-5, 8 64
————— \$382 29
22. William Dickson and James Dickson, Jr.
Grubbing \$60, dist 1-5, \$48
————— \$48
23. Henry Mallory, Silas Harris, Jonathon Spal-
ding, Richard W. Sherman, Jno. J. Sherman
and Stephen B. Martindale,
Grubbing \$70, dist 1-5, \$56
Excavation 3586 c yds 8 cts, dist 1-5, 229 51
————— \$285 51
24. Same company, Grubbing \$55, dist 1-5, \$44
Excavation 2149.2 c yds 8 cts
dist 1-5, 137 54
Solid rock 48 cts 1 c yd, dist 1-4, 38
————— \$181 92
25. Cooper Barckley, Jno. Bartley and Wm.
Latta, Grubbing \$50, dist 1-5, \$40
Excavation 2149 2 c yds 8 cts, dist 1-5, 186 20
Embankment 90 c yds 10 cts, dist 1-5, 7 20
\$15 for removing stumps, dist 1-5, 12
————— \$245 40

26. George Hurst and Henry Hurst,		
Grubbing \$30, dist 1-5,	\$24	
Excavation 444.7 c yds 7 cts, dist 1-5,	249 16	
Embankment 776 c yds 10 cts, dist 1-5,	62 08	
	<hr/>	\$335 24
27. Arthur Cullum, Jas. Dickson and Warren Payson,		
Excavation 156 c yds 8 cts, dist 1-5,	\$9 98	
Extra labour \$220, dist 1-5,	176	
	<hr/>	\$185 98
28. Albert E. Bull, Grubbing \$7, dist 1-5	\$5 60	
Excavation 2,990 c yds		
9 cts, dist 1-5,	215 28	
Bog ore 19 yds, solid rock		
one yd 50 cts, dist 1-5,	8	
	<hr/>	\$228 88
29. Jared Shattuck, Wm. Magaw and Albert E. Bull,		
Grubbing \$30, dist 1-5,	\$24	
106 perch of stone quarried, at \$1		
dist 1-5,	84 80	
	<hr/>	\$108 80
30. Thomas King, Grubbing \$40, dist 15,	\$32	
Excavation 1762 c yds 8 cts dist 1-5,	112 77	
	<hr/>	\$144 77
31. Cooper Barclay, Jno. Bartley and Wm. Latta,		
Grubbing \$90, $\frac{1}{2}$ done \$45, dist 1-5,	36	
Excavation 59.2 c yds 7 cts, dist 1-5,	3 31	
	<hr/>	\$39 31
32. Thomas King, Grubbing \$130, dist 1-5,	\$104	
Excavation 626 c yds 8 cts		
dist 1-5,	40 06	
Slope wall 225 perches \$1 50 per		
perch and an addition of 50		
per cent as per agreement,		
\$4 50, dist 1-5,	360	
154 per stone quarried at \$1 per		
perch, dist 1-5,	123 20	
	<hr/>	\$627 26
33. Robert Mead, Grubbing \$180, $\frac{9}{10}$ done		
\$162, dist 1-5,	\$129 60	
Excavation 940.7 c yds		
12 $\frac{1}{2}$ cts, dist 1-5,	294 07	
Solid rock 8.3 c yds 75 cts		
dist 1-5,	4 98	
\$25 for moving logs,		
dist 1-5,	20	
	<hr/>	\$448 65
Hugh Brawley and Hugh M'Dill,		
Grubbing \$190, dist 1-5,	\$152	
Excavation 996.8 c yds 10 cts, dist 1-5,	79 71	
Solid rock 66.7 50 cts, dist 1-5,	26 68	
	<hr/>	\$258 3

Alexander M'Claskey and Alva Barr,
Grubbing §1 30, dist 1-3,

§104

——— §104

RECAPITULATION.

Sect. 1	§347 8	19	§12 80
2	351 5	20	420 18
3	189 75	21	382 29
4	76 80	22	48
5	120	23	285 51
6	134 17	24	18 92
7	250 88	25	245 40
8	178 45	26	335 24
9	140 49	27	185 98
10	149 92	28	228 88
11	72	29	108 80
12	202 62	30	144 77
13	122 37	31	39 31
14	103 18	32	627 26
15	95 82	33	448 65
16	10	34	258 39
17	245 89	35	104
18	336 60		
		Total	§7,184 45

Sect.	Date.	Contractors.	Prop. grubbed.	Yards excav.	Yards embk.	Yards solid rock.	Perch slope wall.	Perch stone quarried.	Extra.
No. 1	26	James Brawly,	$\frac{7}{8}$	1377		265			Drain under bank estima- ted at \$12.
2	25	Henry Colt,	$\frac{5}{6}$	451		72	123.5		
3	25	Alexander Shaw	grubbed	154.4	153				
4	27	Albert E Bull	$\frac{4}{5}$						A few stumps yet remain- ing on this section.
5	27	Arthur Collum & Co.	grubbed						
6	25	John Masters	$\frac{5}{6}$	1169	\$45				
7	25	Avery & M'Claskey	grubbed	2273					
8	25	Arthur Cullum	$\frac{6}{8}$	596					
9	25	Samuel Harroon	$\frac{8}{9}$	529					Extra labor done \$70 \$115 allowance for re- moving timber from road. \$46 allowance.
10	25	Elliott Harroon	grubbed	1030					
11	25	Henry Hurst	$\frac{3}{4}$						
12	21	Albert E. Bull	$\frac{8}{10}$	1266					
13	21	Albert E. Bull	$\frac{4}{5}$	962					
14	21	Daniel Smith	$\frac{5}{7}$	504					Extra labor done \$70 \$115 allowance for re- moving timber from road. \$46 allowance.
15	21	David Compton	grubbed	664.2					
16	27	M'Claskey & Barr	$\frac{1}{2}$						
17	19	Levi Cox	grubbed	2304					
18	19	John J. Lyons	grubbed	2720	410	20			
19	27	M'Claskey & Barr	$\frac{1}{10}$						
20	27	John Readle	grubbed	4414					
21	27	Arthur Collum & Co.	grubbed	4123	120				
22	27	William & James Dickson	grubbed						

Sect.	Date.	Contractors.	Prop grubbed.	Yards excav.	Yards embk.	Yards solid rock.	Perch slope wall.	Perch stone quarried.	Extra.
No. 23	16	J. Spalding & Co.	grubbed	366.2		1			{ \$15 allowance for remov-
24	16	do.	grubbed	2149.2	90				{ ing stumps from clay pit.
25	27	Cooper, Barckley & Co.	grubbed	3724	776				{ \$70 allowance for removing
26	16	George & Henry Hurst	grubbed	4449.7					{ wharf at M'Gaw's mill and \$150
27	27	Athur Collum & Co.	grubbed	156					{ for 300 perch of rubble.
28	16	Albert E. Bull	grubbed	2990				106 \$1	{ Bog-ore 19 yards solid rock
29	27	Jared Shattuck & Co.	grubbed	1762					{ 1 yard 50 cents.
30	27	Thomas King	grubbed	592					
31	27	Cooper Barckley & Co.	$\frac{1}{2}$ grubbed	626			225	154 \$1	{ \$25 allowance for remov-
32	27	Thomas King,	$\frac{9}{10}$ grubbed	2940.7		8.3			{ ing logs from road.
33	27	Robert Mead,	$\frac{10}{10}$ grubbed	996.8		66.7			
34	27	Browley & M'Dill							
35	26	M'Claskey & Barr	grubbed						

Amounts of cost.		Payments made thereon.	
Sect.		Sect.	
1	\$433 85	1	\$347 8
2	438 81	2	351 5
3	237 18	3	189 75
4	96	4	76 80
5	150	5	120
6	167 71	6	134 17
7	313 60	7	250 88
8	223 6	8	178 45
9	175 61	9	140 49
10	187 40	10	149 92
11	90	11	71
12	253 27	12	202 62
13	152 96	13	122 37
14	128 97	14	103 18
15	119 77	15	95 82
16	12 50	16	10
17	307 36	17	235 89
18	420 75	18	336 60
19	16	19	12 80
20	525 22	20	420 18
21	477 86	21	382 29
22	60	22	48
23	88	23	285 51
24	227 40	24	181 92
25	306 75	25	245 40
26	419 5	26	335 24
27	232 47	27	185 98
28	286 10	28	228 88
29	136	29	108 80
30	180 94	30	144 77
31	49 13	31	39 31
32	784 7	32	627 26
33	560 81	33	448 65
34	322 98	34	258 39
35	130	35	104
<hr/> \$8,980 56 $\frac{1}{4}$		<hr/> \$7,184 45	

Respectfully submitted, &c.

JOHN PHILLIPS,

Superintendent French Creek Feeder Pa. Canal.

No. 2.

To the Honorable David Scott, President of the board of Canal Commissioners of the state of Pennsylvania:

SIR—In obedience to instructions from the commissioners received through their secretary, I have prepared in detail an estimate of the probable expense of constructing that part of the French creek feeder, now under contract at the contract prices.

An estimate similar to the one now submitted, was presented to the superintendent previous to the time of letting out the work. The only difference between the one and the other, being that in *this*, the quantities of excavation and embankment are more accurately set down, and the prices for each, are now the price of the contract, instead of the estimate of the engineer. The number and dimensions of the culverts are also now definitely settled, and the sites and structure of the bridges concluded on. The other duties assigned to the engineer on this section, have left no time for completing drawings, other than those necessary to be exhibited to the contractors. Plans, &c. for the use of the commissioners, will be prepared at as early a date as possible.

It will be observed that in locating the line of the feeder, the engineer was restricted in his choice of ground, to such as would preserve a level, corresponding to the height to which it had been determined to raise the Conneaut lake. And in consequence of this condition, the site of the feeder could not be so favourably located as in ordinary cases, where by changing the level, a line can be followed more in accordance with the peculiar formation of the country. The compliance with this limitation in the present instance, has placed the feeder on rather unfavorable ground. Its site for nearly the whole distance from Bemis' dam, to the place of the aqueduct, being on the face of a steep bank, which stands at an angle from 30 to 48 degrees with the horizontal plane, and extends at this inclination about thirty feet above the bottom of the feeder, and from 5 to 15 feet below it. Three fifths of the whole distance is of this character; and where not exactly of the description above given, it varies only in the depth of the low grounds lying at the foot of the bank, the bank itself preserving nearly a constant elevation, below which the tributary torrents of French creek have in mingling their alluvions with that of the larger stream, formed an irregular and undulating surface. This bank is so prominent a feature in the topography of the region, that the oldest roads of the country were placed upon its face, or at its base. In consequence of which, for three miles out of nine, the difficulties arising from the nature of the soil have been augmented, from the necessity of removing from the beds of those roads (which are immediately under the base of the feeder bank), large quantities of timber and brush. Another consequence of this location, and which increases its expense considerably, is the frequent use of culverts. The streams are mostly small, but so impetuous, as to make it very inadvisable to receive them into the feeder; and in

many instances, crossing so much below its level as to render this disposition of them impossible. But in addition to the number of culverts necessary on the line, there is the further consideration that this construction must be peculiarly expensive. The ordinary timber foundation, would scarcely be safe, and certainly not advisable, in streams, the beds of which are perfectly dry for the greater part of the season. At the same time that the quantity of the bank, above each of them, would render a breach in the canal, at such a point, peculiarly difficult to repair. The culverts have therefore been contracted to be built with stone foundations, terminating in an inverted arch, and having their water way lined with brick.

There is a single instance also where the peculiar nature of the bank, from which the streams have their origin, has occasioned a difficulty of another kind: The amphitheatre in which the village of Meadville stands, has been formed by the united deposits of French creek and Mill run. The smaller and more rapid streams, bringing down its heavier burthen of loose rock and pebble which has been covered over and consolidated by the finer deposits of the larger one. For this cause the plain at the base of the bank near Meadville is higher than at any other point, and the Mill run, which at its greatest floods, discharge 304.6 cubic feet per second, crosses the line of the feeder above the level of the bottom, rendering the construction of a culvert of sufficient dimensions to avoid its greatest discharge, very difficult and expensive, while at the same time the expedient of taking it into the feeder would scarce be resorted to, unless indeed there were no other course possible. To avoid this it was deemed better to change the direction of the run some distance higher up, and by making a cut of about 60 perches in length, to divert the waters of this unmanageable stream, to a place where the feeder is located on the steep bank of the creek, and a culvert of the necessary size can be more easily constructed. This place is near a mill owned by W. A. V. Magane, which derives its supply of water from the Mill run. And an additional inducement to make this disposition of the run, was, that the proprietor of the mill having also the right to the use of the water in the run, might at any time, divert the whole of it, in the direction of the mill, which would render the construction adopted now in the first instance, a matter indispensable, unless indeed the state were to purchase from the owners of the mill, their right to the use of the water,

The peculiar formation of the country on which the feeder is located, will also increase the difficulty and expense of landing up the bridges. The contents of some of the bridge embankments amounting to 1000 cubic yards.

In relation to the probable expense of completing the portion of the feeder now under contract, I am decidedly of opinion, that except in a single instance (I mean on section 8) the prices of *excavation* in the original estimate, submitted on the 15th August (a copy

of which will be transmitted by the superintendent) were rather too low, than too high. And as it cannot be conceived that the contractors intend to loose to a very great amount in the service of the state, and yet have to all appearance offered to do the work for a third less than its absolute value, the inference seems unavoidable that the contracts will be abandoned.

This anomaly however, will disappear, when the commissioners are made aware of the expectations of the contractors. They, it seems, understood that the contract prices for excavation and embankment, were to be applicable only to the lightest and most easily excavated earths, (a sort of substance not often found in public works) and not such substances as the sections were known to consist of previous to the time of contract; and that where the ground was uncommonly tenacious, though its precise quality was as well known previously, as at present, the engineer was, by allowing one third rock, or one fourth hard-pan, to sanction additional expenditure to any amount, rendering the contract of no use or validity at all, except as it empowered him to make any allowance he should think proper.

This being the understanding, it will be seen from the schedule of contract prices, that though the prices of ordinary excavation (the advance guard of the contractor) are in every instance put at the most reasonable rate, still there is a formidable covering party in the rock and hard-pan, by which it seems he supposed the prices were to be regulated. The rock has been allowed where it was absolutely found. The hard-pan has not been allowed at all. With regard to the latter substance, had it been encountered unexpectedly, it is my opinion that it should have been allowed, even though it be so ill-defined a material, as to admit of no certain description. But on the French creek feeder, though the ground be indeed terribly hard, in some instances, it was nevertheless known to be so; and in all cases where the character of the ground has been previously determined, the proposition for *ordinary* excavation should, if it mean any thing, mean the price for which the earth, of which this section is known to consist, can be removed. Some of the sections may perhaps be executed for the prices of the contract. These I think are No. 4, 7, 8, 9, 10, 14, 26, 27, 29 and 33.

In the annexed estimate, the prices of excavation, and for the culverts, are the prices of the contract and the quantity of rock judged of from demonstration already made of the nature of the soil.

Respectfully submitted,

J. FERGUSON, *Engineer.*

-Meadville, Nov. 15, 1827.

ESTIMATE.

Section No. 1.		Grubbing	\$250 00
	Excavation 9744 yds. earth at 8½ cts.	828 24	
	do 2436 sol. rock at 37	901 32	
		<hr/>	1979 56
	Fencing	108	
	Waste weir, 20 feet breast	59	
		<hr/>	\$2 46 56
Section No. 2.		Grubbing	\$220
	Excavation 1883.7 yds. at 7 cts.	1318 59	
	do. rock 2000 40	800	
	Slope wall 828 perches \$1 50	1242	
	Fencing	108	
		<hr/>	\$3688 59
Section No. 3.		Grubbing	\$100 00
	Excavation 7789.5 yds. at 8 cts	623 16	
	Embankment 1782.8 11	196 10	
	Culvert of 6 feet chord	485 50	
	2 farm bridges	280	
	Fencing	150	
		<hr/>	\$1830 76
Section No. 4.		Grubbing	\$120 00
	Excavation 15802 yds. 7 cts	1106 14	
	Embankment 7197 15	1069 05	
	Culvert of 6 feet chord	485 50	
	Culvert of 4 feet chord	240 75	
	Farm bridge	140	
	Fencing 194 perches at 75 cts.	145 50	
		<hr/>	\$3306 94
Section No. 5.		Grubbing	\$50
	Excavation 9168 yds. at 7½ cts	687 60	
	Embankment 2640 9	237 60	
	Culvert of 6 feet	485 50	
	Fencing	115 50	
		<hr/>	\$1676 20
Section No. 6.		Grubbing	\$75
	Excavation 5313 yds. at 9 cts	478 17	
	Embankment 1408 10	140 80	
	Farm bridge	140	
	Fencing	115 50	
		<hr/>	\$949 47

Section No. 7.	Grubbing	\$120
	Excavation 4489.4 yds. at 7 cts	314 25
	*Embankment 7024.8 15	1053 72
	Culvert of 6 feet chord	485 50
	Fencing 146 perches	109 50
		<hr/>
		\$2082 97
Section No. 8.	Grubbing,	\$ 210
	Excavation, 8851, at 11 cents,	973 61
	Embankment, 09, at 13 c.	79 17
	Culvert, of 5 feet chord,	402 75
	Fencing,	108
		<hr/>
		\$ 1773 53
Section No. 9.	Grubbing,	\$ 144
	Excavation, 7790 yds. at 9 cents,	701 10
	Culvert, of 6 feet chord,	485 50
	Fencing,	127 50
		<hr/>
		\$ 1458 10
Section No. 10.	Grubbing,	\$ 105
	Excavation, 7030 yds. at 8 cents,	562 40
	Embankment, 1760 yds. at 10 cts,	176
	Culvert, of 4 feet chord,	240 75
	Culvert, of 3 feet chord,	160
	Farm bridge,	140
	Fencing,	120
		<hr/>
		\$ 1504 15
Section No. 11.	Grubbing,	\$ 120
	Excavation, 6319.5, at 8 c.	505 56
	Embankment, 112.8, at 10 c.	11 28
	Farm bridge,	140
	Fencing,	120
		<hr/>
		\$ 897 59

(*) The contract price is 10 cents, but as the earth is hauled a considerable distance out of the canal, for which extra distance the allowance is at the estimate of the engineer.—It has been thus put down in the estimate.

Section No. 12. Grubbing,	\$ 190
Excavation, 9204, at 8 cents,	736 32
Embankment, 765.5, at 11 cts.	194 20
Culvert, of 4 feet chord,	240 75
Farm bridge,	140
Fencing,	108

\$ 1609 27

Section No. 13. Grubbing,	\$ 95
Excavation, 7440.4, at 8 cents,	595 23
Embankment, 1116, at 9 cents,	100 44
Two farm bridges,	280
Fencing, 144 perches,	108

\$ 1178 67

Section No. 14. Grubbing,	\$ 110
Excavation, 11921.4, at 10 cents,	1192 14
Embankment, 1703, at 11 cents,	187 33
Farm bridge,	140
Fencing, 154 perches,	115 50

\$ 1744 97

Section No. 15. Grubbing,	\$ 60
Excavation, 9688.6, at 9 cents,	871 97
Embankment, 2882.6, at 10 cts.	288 26
Culvert, of 6 feet chord,	485 50
Fencing,	151 50

\$ 1849 23

Section No. 16. Grubbing,	\$ 25
Excavation, 11,486.4, at 7 cents,	804 04
Embankment, 2956, at 10 cts.	295 60
Two farm bridges,	280
Culvert, of 3 feet chord,	160
Culvert, of 4 feet chord,	240 75
Waste weir, 30 feet breast,	88 50
Fencing,	116 25

\$ 2010 14

Section No. 17. Grubbing,	\$ 100
Excavation, 17121, at 9 cents,	1540 90
Embankment, 1406, at 10 cts.	140 60
Three culverts, of 3 feet chord, each,	480
Farm bridge,	140
Fencing,	123

\$ 2524 50

Section No. 18.	Grubbing,	\$ 150
	Excavation, 13,732. at $6\frac{1}{2}$ cents,	858 26
	Embankment, 1664, at $7\frac{1}{2}$ cts.	124 80
	Culvert, of 6 feet chord,	485 50
	Farm bridge,	140
	Fencing,	123
		<hr/>
		\$ 1881 55
Section No. 19.	Grubbing,	\$160
	Excavation 15472.6 at 8 cts,	1,237 80
	Embankment 10260 10 cts,	1,026
	Culvert of 6 feet chord,	485 50
	Fencing,	130 80
		<hr/>
		\$3,040 10
Section No. 20.	Grubbing,	\$90
	Excavation 24,815. 7 cts,	1737 5
	2 culverts of 4 feet chord,	481 50
	2 culverts of 3 feet chord,	320 00
	2 culverts of 2 feet chord,	179 60
	Farm bridge,	140
	Fencing, (172 perches)	129
		<hr/>
		\$3,077 15
Section No. 21.	Grubbing,	\$50
	Excavation 14,088, 9 cts	1260 92
	Embankment 1838.7 9 cts	165 48
	Culverts of 3 feet chord,	160
	Culvert of 5 feet chord,	402 75
	Farm bridge,	140
	Fencing, (176 perches)	132
		<hr/>
		\$
Section No. 22.	Grubbing,	\$60
	Excavation 4586.7, 9 cts,	412 80
	Culvert of 3 feet,	160
	Fencing,	114
		<hr/>
		\$746 80
Section No. 23.	Grubbing,	\$35
	Excavation 10012 yds, 8 cts,	800 96
	Embankment 1765.6, 10 cts,	176 56
	Road bridge,	240
	Fencing,	162
		<hr/>
		\$1414 52

Section No. 24. Grubbing,	\$55
Excavation 5912, 8 cts,	473 52
Embankment 657, 10 cts,	65 70
Fencing,	108

\$712 22

Section No. 25 Grubbing,	\$50
Excavation 5233, 6½ cts,	327 06
Embankment 665, 10 cts,	60 50
Culvert of wood,	36 50
2 road bridges,	480
Fencing,	126

\$1,085 46

Section No. 26. Grubbing,	\$50
Excavation 6205.3, 7 cts	434 37
Embankment 1209, 10 cts,	120 90
Wooden culvert,	29 40
3 Town bridges,	720
Fencing,	129

\$1,463 67

Section No. 27. Grubbing, (no estimate.)	
Excavation 18,624.1, 8 cts	\$1,489 92
Embankment 924, 9 cts,	83 16
Wall 1061 perches, \$2,	2122
Rubble 400 perches, 50 cts,	200
Culvert of 12 feet chord,	930
3 Town bridges,	720
Fencing,	123

\$5,688 40

Section No. 28. Grubbing,	\$7
Excavation 4130, 9 cts,	371 70
Embankment 212, 10 cts,	21 20
Timber slope or will fall,	220
2 bridges,	62
(No fencing.)	

\$1 90

Section No. 29. Grubbing,	\$30
Excavation, 15,727, 8 cts,	1,258 16
Slope wall 2198 perches, \$2,	4,396
Culvert of 3 feet chord,	160
Fencing,	100

\$5944 16

Section No. 30. Grubbing,	\$40
Excavation 6165, 8 cts,	493 20
Fencing,	119 70

\$652 90

Section No. 31. Grubbing,	\$90
Excavation 13,809, 7 cts	966 63
Of slope wall 294 perches, \$2,	588
Wastewear 40 feet breast,	118
1 Farm bridge,	140
Fencing,	114

\$2,016 63

Section No. 32. Grubbing,	\$130
Excavation 23,196.8, 8 cts,	1855 74
Of protection wall 3020 per. \$1 80,	5436
Culvert of 3 feet chord,	160
Culvert of 4 feet chord,	296
Fencing,	132

\$8009 74

The contract price is \$2, with a provision in case the stone used be found on the ground.

Section No. 33. Grubbing,	\$180
Excavation 12,745, 12½ cts,	1593 12½
Protection wall 2230, perch, \$2,	4460
Culvert of 4 feet chord,	140 75
Fencing,	118

\$6591 87½

Section No. 34. Grubbing,	\$190
Excavation 10,038 yds, 10 cts,	1003 80
Culvert of 4 feet chord,	240 75
Farm bridge,	140
Fencing,	126

\$1700 55

Section No. 35. Grubbing,	\$130
Excavation 9188.5, 7 cts,	643 19
One farm bridge	140
Culvert of 5 feet chord,	402 75
Wastewater of 30 feet breast,	88 50
Fencing,	126
	<hr/>
	\$1530 44
	<hr/>

RECAPITULATION.

Sect. No. 1	\$2,146 56	19	\$3,040
2	3,688 59	20	3,077 15
3	1,830 76	21	2,318 15
4	3,306 94	22	746 80
5	1,676 20	23	1,414 52
6	949 47	24	702 22
7	2,082 97	25	1,085 56
8	1,773 53	26	1,463 67
9	1,458 10	27	5,668 40
10	1,504 15	28	681 90
11	897 59	29	5,944 66
12	1,609 27	30	652 90
13	1,178 67	31	2,016 63
14	1,744 97	32	8,009 74
15	1,849 23	33	6,591 87½
16	2,010 14	34	1,700 55
17	2,524 50	35	1,530 44
18	1,881 55		<hr/>
			\$80,758 55½

No. 3.

List of Engineers, assistant engineers, clerks, superindendants and other persons employed upon the French creek feeder. A. D. 1827.

John Phillips superintendant, \$3 per day.

Wm. Moore, clerk, \$2 per day while actually engaged.

James Ferguson, engineer, at \$2000 per annum.

B. B. Vincent, assistant engineer, \$60 a month.

James Wilson, target bearer from 16 June at \$1 50 a day.

D. M. Farrelly, do from 25 June, to 28 July \$1 50 a day.

James M. Terbett do from 28 July, at \$1 50 a day.

Robert Neil, chainman, from 25 June to 1 Sept. at \$20 a month and from 1 Sept. at \$30 a month.

William Miles, chainman from 25 June to 25 August, at \$20.

Wm. Rundle, axeman, from 25 June to 25 Aug. at \$20 a month and from 16 Sept. at the same.

James Henry, axeman, from 25 June to 25 Aug. at \$20 per month.

During the present month all persons employed by the engineer were discharged, except Mr. Vincent, assistant engineer, and it is not intended to employ any other persons during the winter.

In making examinations down French creek to Franklin, the following persons were employed by the engineer.

James Herrington, surveyor, \$2 per day, 11 days.

James Wilson, surveyor, \$2 per day, 15 days.

Robert Neil, target man, \$1 per day, 15 days.

Edward Herrington, chainman, \$1 per day, 11 days.

John Shields, chainman \$20 per month, 25 days.

S. W. Montgomery, flagman, \$20 per month, 15 days.

Joseph Neil, axeman, 2¹/₂ per month, one month.

Respectfully submitted,

JOHN PHILLIPS, *Superintendent.*

Dec. 26, 1827.

Series 5.

No. 1.

To the President and Board of Canal Commissioners.

GENTLEMEN,

I beg leave to present to you my annual report, upon the several works confided to my care, accompanied with statements, to which I will in due order refer.

The first papers, to which I shall refer, are the lists of contracts, on the two divisions, marked A. 1 and A. 2. These lists embrace all the contracts entered into "during the year preceding the first Monday in November," as called for by the act of April 16th, 1827. And although some of them have already been reported to the board, yet as my annual exhibition, I have thought best to make it in exact accordance with the act of assembly. A number of contracts have been made upon both divisions, since the first Monday of November, which will properly come into the next annual report. The contracts upon the eastern division, are numerous and many of them trivial in magnitude; but they were made necessary, by omitting to study the strict import of the law, in framing the original contracts. Custom had established a law, on canal works, as was understood, that whatever work should necessarily occur, on a section, in its progress to completion, other than was specified in the original contract, should be estimated by the engineer, and paid accordingly. But it was decided by the accounting officers, (and I have no doubt correctly,) that, in the words of the law, "all contracts for the construction of any part of the improvements contemplated by this act, shall be made in writing." This created the necessity for a new contract, and sometimes two or three in succession, on nearly every section. This difficulty has been obviated, on the Susquehanna division, by inserting a provision in the original contracts, that all work which may necessarily occur on the section, not specifically provided for, shall be paid for at the estimate of the engineer.

I do not feel called on, as acting commissioner, to report any comparison between the engineer's estimates and the actual contracts, as intimated in the latter clause of the third section of the act of April 16. Nor would it be in my power, if it were thought incumbent. The engineer's estimates are made by the *mile* in round sums, upon data of his own. We contract for sections of *half a mile each*, no two of which exactly corresponding, in limits with the original mile, at a certain price per yard, perch, &c. and unless we know the exact amount of work in each section, it would be impossible to say whether a section would cost less or more than the original estimate. I am of opinion, however, that the cost of the whole line, upon the Susquehanna division, will not exceed the original estimate of Mr. Guilford.

The next reference I make, is to the lists of assistant engineers, target men, &c. on the two divisions. They are separate, and are

marked B. 1 and B. 2. It is presumed they are sufficiently explicit, without further remark.

My third reference is to the statement of damages, marked C. That relates wholly to the eastern division. The only damage contract, on the Susquehanna division, previous to the first Monday in November, was with Jonathan Rafter, for one acre of ground, on the 33d, section, on which are a log dwelling house, smith-shop and small stable. The ground will be so far taken up, by the canal and road, that the residue will be utterly useless. The agreement was to give him one hundred and seventy five dollars, he to have the privilege of taking his buildings and fences, wherever he pleases, out of the way of the canal.

The five damage suits, brought under the old law, and reported last year, remain exactly as they did when reported.

Three applications only have been made to the court under the late law:—The result of two of them is contained in statement C; and in the other case, the viewers reported that they found the canal "*not quite done*," through the farm. In the case of Christian Gross, referred to, no exception has been taken to the award; but, in that of George Fisher, Esq. five exceptions have been filed; one of which, in substance is, that he holds or claims contiguous lands, through which no pretence is made that the canal is finished, and for which he made no application to court. Even-handed justice would require, that the contiguous lands of the same owner should be all subjected to one and the same inquisition, so that the spirit of the law might be honestly complied with, that in case one tract was injured and another benefitted, the balance might be fairly struck; else opportunity might be given to an individual, to recover damages, upon one piece of property, while he was pocketing the benefits of another, by keeping it out of view. If the law, at present will not bear our construction, I hope the legislature will see to it.

The last reference that I make, is to the general statements of the progress and state of the work, on the two divisions, marked D. 1, and D. 2. These are not called for by law or resolution of the board, but are made for the satisfaction of the public, in case the board should see proper to communicate them. By these it will be seen, that the work returned, on the Eastern Division, is as follows: Earth excavation, 564,675½ cubic yards—clay 59,576—solid rock 96,016—slate rock, 42,920—embankment, 370,741½—puddling, 10,993 cubic yards; wall, including locks, aqueducts, culverts and bridges, 99,283½ perches. Grubbing to the amount of \$3000 33.

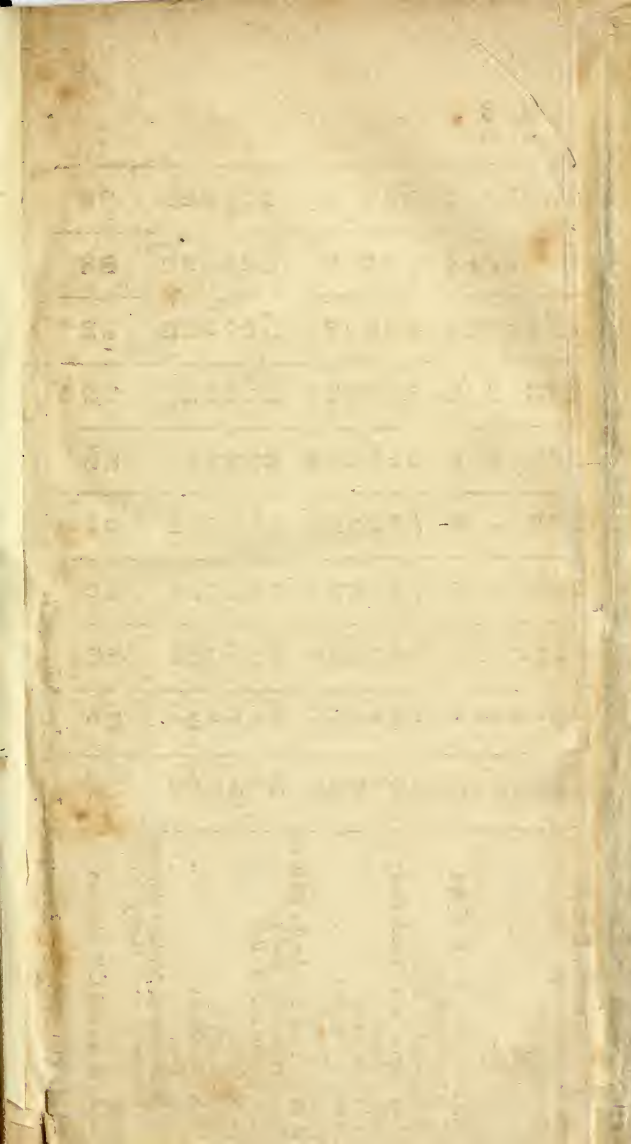
Making the cost of work returned as done, to the		
first of December,		\$337,716 58
Payments made on the work,	\$320,798 72	
Retained until completion,	16,917 86	
	<hr/>	\$337,716 58

The whole work upon this division, is not yet completed. Unforeseen embarrassments have retarded its progress in some parts. Among these, sickness, and consequent scarcity of hands, have had some agency. The extension of the work, at Peter's mountain, created a heavy addition to the labor upon this line, which will require another season to complete in this part. Before this additional work can be finished, all the other work on the line will be completed. Little excavation remains to be done, except on the 4th and 7th sections; and they have been but lately commenced, or rather the 4th was lately re-commenced. Five locks are completed, with the exception of hanging the gates on four of them—three others are nearly done. The materials are mostly prepared for the guard-lock; and for the lift lock lately determined on, preparations are making to construct it early in the spring. The aqueducts at Paxton creek and Fishing creek are completed, except the railing; and those at stony creek and Clark's creek, are commenced, and will be finished as soon as the season opens. The stone work has been executed in the first style of workmanship, and we apprehend will bear the test of practical use. No reasonable occurrence can possibly prevent us from filling the canal, from Fishing creek, six miles above Harrisburg, to Middletown, a distance of fifteen miles, in March next; which will open a water communication, through the Union and Schuylkill canals, from this place to Philadelphia.

On the Susquehanna division, no section has been entirely completed. Several are almost finished, among which is No. 19, executed by Ritner, M'Cord and Co. which is one of the heavy wall sections on this line. This section of half a mile, the tow-path bank made partly in the river, and slope-walled the whole distance, will have been completed in less than four months from its commencement, at an expense, including a road on the upper side, the whole way, not exceeding ten or eleven thousand dollars. We have no doubt the whole work upon this line, may be completed before the meeting of the next legislature. The amount of work returned, as done upon this division, as will be seen by reference to statement D. 2, is, of earth excavation, 223,881 cubic yards—of rock, 6,620; of slate, 768—hard-pan, 2,236—embankment, 70,449 cubic yards; puddling 320—and of wall, 6,843 perches. Grubbing to the amount of \$4,482 75—and for materials and labor, on H. W. Snyder's mill-dam, \$750,

Making the whole amount of estimates,	\$42,885 14
Payments made,	\$36,109 54
Leaving a balance to be paid,	6,775 60
	<hr/> \$42,885 14

There is one small matter, on which I am induced to suggest the solicitation for legislative enactment. Some small sums of money have been derived from the progress of the canal, upon the eastern division, for the application of which there seems to be no legal provision. Fence, sold from a lot purchased of Hise & Lauman,



The whole work upon this division, is not yet completed. Unforeseen embarrassments have retarded its progress in some parts. Among these, sickness, and consequent scarcity of hands, have had some agency. The extension of the work, at Peter's mountain, created a heavy addition to the labor upon this line, which will require another season to complete in this part. Before this additional work can be finished, all the other work on the line will be completed. Little excavation remains to be done, except on the 4th and 7th sections; and they have been but lately commenced, or rather the 4th was lately re-commenced. Five locks are completed, with the exception of hanging the gates on four of them—three others are nearly done. The materials are mostly prepared for the guard-lock; and for the lift lock lately determined on, preparations are making to construct it early in the spring. The aqueducts at Paxton creek and Fishing creek are completed, except the railing; and those at stony creek and Clark's creek, are commenced, and will be finished as soon as the season opens. The stone work has been executed in the first style of workmanship, and we apprehend will bear the test of practical use. No reasonable occurrence can possibly prevent us from filling the canal, from Fishing creek, six miles above Harrisburg, to Middletown, a distance of fifteen miles, in March next; which will open a water communication, through the Union and Schuylkill canals, from this place to Philadelphia.

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Making the whole amount of estimates,	\$42,835 14
Payments made,	\$36,109 54
Leaving a balance to be paid,	6,775 60
	<hr/> \$42,885 14

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List of Contracts made on behalf of the State, during the year preceding the 1st Monday in November, A. D. 1827, by Charles Mowry, Acting Commissioner on the Susquehanna Division of the Pennsylvania Canal, together with the Names of the Persons with whom such Contracts have been made.

No. of Section.	Date of contract.	Names of Contractors.	PER CUBIC YARD.										Per perch.	Shaping road. Per rod.	
			Grubbing and clearing.	Excavation.	Embankment.	Puddling.	Rock.	Slate.	Hard pan.	Vertical wall.	Outer slope wall.	Inner slope wall. Per sq. yard.			
3	1827.														
4	Aug. 28	Alex. T. McHargue and J. White	10	8	12½	6	50	37½	14	60	40	15			
5	Sept. 26	A. Conlon, J. Hines, and J. Hagerly	23	8	12	6	50	30							
6	Aug. 26	Eli Russell	23	9	11	9	49	28	10	85	25	25			
7	Aug. 11	John Tyson,	23	9	13½	6	43	18	14	70	60	15			
8	Aug. 11	Barrett and J. Dougherty,	75	9	12	16	40	30	30						
9	Aug. 10	M. Noland, F. O'Harrow, and J. Duggan	90	9	14	20	56	25	14	40	40	18			81 00
10	Aug. 10	John Duggan	90	8	14	20	50	25	14	40	40	18			1 00
11	Aug. 11	Elijah Dodd, R. Reston, and	75	10	12½	8	55	20	14	75	62½	13			
12	Aug. 11	Do. Do.	75	10	12½	8	55	20	14	75	62½	13			
13	Aug. 10	John Ekel	200	9	13	25	40	25	20	75	50	40			
14	Aug. 10	Do.	200	9	15	25	40	25	20	75	50	40			
15	Aug. 10	John Seale	180	11	15	25	62½	25	35	50	45	35			
16	Aug. 14	Samuel Hopkins.	250	10	15	15	45	25	15	60	45	30			
17	Aug. 14	Do.	100	10	15					60	45	30			
18	Aug. 24	Christian Glenn, W. & S. Hunter	200	11	12½	12½	50	50	20	50	45	15			
19	Aug. 10	John Fordward & G. W. Sanford	150	10	13½	13	50	52	14	100	17				
20	Aug. 11	Do. Do.	87½	8	13	50	49	33	12	45	45	37			1 00
21	Aug. 11	Do. Do.	87½	8	13	50	49	33	12	45	45	37			1 00
22	Aug. 11	Do. Do.	110	8	15	20	49	33	12	45	45	37			1 00
23	Aug. 11	Do. Do.	123½	10	15	22	50	20	16	45	69	16			1 00
24	Aug. 11	Do. Do.	123½	10	15	22	50	20	16	45	69	16			1 00
25	Aug. 11	Do. Do.	50	10	12	50	50	16	17	62½	70	13			
26	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
27	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
28	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
29	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
30	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
31	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
32	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
33	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
34	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
35	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
36	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
37	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
38	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
39	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
40	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
41	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
42	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
43	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
44	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
45	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
46	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
47	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
48	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
49	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
50	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
51	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
52	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
53	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
54	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
55	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
56	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
57	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
58	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
59	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
60	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
61	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
62	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
63	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
64	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
65	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
66	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
67	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
68	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
69	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
70	Aug. 11	Do. Do.	123½	10	12					62½	70	13			
71	Aug. 11	Do. Do.	123½	10	12					62½	70	13			

A.-2.

during the year preceding the 1st Monday in November, A. D.
 ner on the Susquehanna Division of the Pennsylvania Canal, toge-
 a such Contracts have been made.

PER CUBIC YARD.

Per perch.

Inspector of the Canal Office, Liverpool, N. Y.

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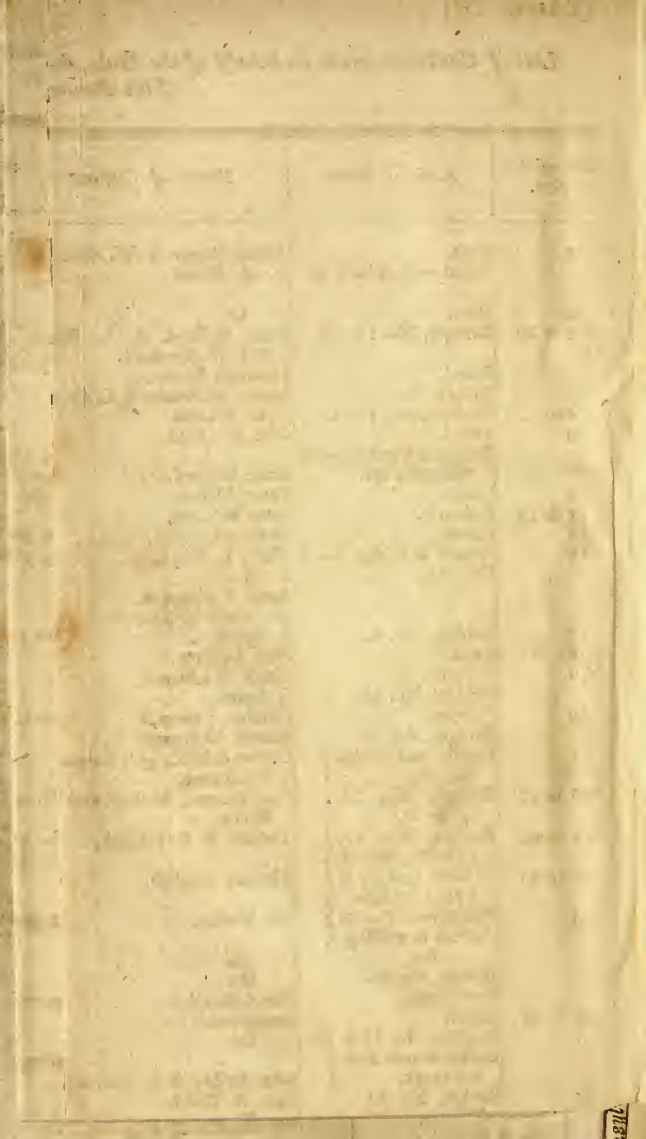
during the year preceding the 1st Monday in November, A. D.
 ner on the Susquehanna Division of the Pennsylvania Canal, toge-
 a such Contracts have been made.

PER CUBIC YARD.		Per perch.
Canal Office, Liverpool,		

List of Contracts made on behalf of the State, during the year preceding the 1st Monday in November, 1921, by Charles Mowry, Acting Commissioner on the Eastern Division of the Pennsylvania Canal, together with the Names of the Persons to whom such Contracts have been made.

No. of Section.	Kind of Work.	Names of Contractors.	Dates of Contracts.	Grab-bing.	Excavation per cubic yard.				Per cubic yard.		Miscellaneous.
					Earth.	Rock.	State (Hard?)	Hard?	Put-ting.	Embank-ment.	
1	Dam.	Abbot Green & W. Cameron,	1827, Sept. 27	Bolls.							
	Canal wall, wharf, &c.	O. H. Dibble,	Oct. 6.	Cents.	Cents.	75	Cents.	Cents.	Cents.	Cents.	
3	Dam.	Do.	March 14								
4 to 20	Bridges, No. 1 to 12.	Isaac McCord, A. L. Beaumont and W. Canfield,	1826, Nov. 11								
	Canal.	Jonathan Leslie,	1827, Sept. 1		104	50	33	14	25	121	
4 to 7	Bridges, No. 2 to 4.	Isaac McCord & C. Quinn,	Oct. 9								
10	Canal.	Isaac McCord,	July 28		14					15	
	Bridge at Clark's creek, without a No.	John C. Auld,	July 10		66					14	
11 & 19	Canal.	Isaac McCord,	Do. 13								
11 & 19	Canal.	Peter Miller,	Aug. 13								
11 & 19	Canal.	Francis McCord,	July 11								
10	Aqueduct and bridge, No. 7.	Christian Ulm,	June 5								
	Culvert.	Philip L. Hays,	July 11		*80	50		35	25	25	
		J. Spink,	June 7								
		Jacob Updegrave,	March 19								
		Archibald McAllister,	Oct. 29								
17	Bridge, No. 2.	J. Spink,	May 6								
18	Canal.	John Laflerty,	June 6								
19	Culvert.	Ulrich Wickware,	July 10		15						
	Bridge, No. 10.	J. Spink,	May 6								
20	Culvert.	Charles Carson,	March 23								
	Bridge, No. 11.	Robert Williams,	May 10								
21	Canal, and bridge?	Carson & McKnight, assignees of U. Wickware,	July 11								
*22 to 27	Bridges, No. 13, 14 to 18.	Paul Fretwell, Michael & William Byrne,	Nov. 18								
*23 to 40	Bridges, No. 13, 14 to 18, &c. to 32.	Thomas & R. English,	Nov. 18								
33 to 45	39 firm bridges & 2 road bridges.	Thomas English,	Oct. 27								
	Bridge over Paxton creek & walling.	Ira Mirich,	May 23								
	Do.	Do.	July 9								
	Bridge, No. 10.	Do.	May 21								
25 & 26	Foot bridge.	David Strachen,	Oct. 23					25			
	Canal.	Beaumont & Co.	June 10					25			
	Bridges, No. 17 & 18.	Do.	July 10								
	Bridge across Pax-ton creek.	John Kelley & J. Germania,	Aug. 29								
27	Bridge, No. 19.	Ezra S. Dodd,	June 7								
	Do.	Do.	Do.								
28	Basin.	W. Anderson, James M'Naeve, Samuel Lind, and Charles Quinn,	June 6	15.	10	50					
30	Culvert.	Jonathan Leslie,	1826, Nov. 28								
	Bridge, No. 31.	Hansen & Kimber,	1827, July 6								
	Do.	Jonathan Leslie,	1826, Nov. 13								
	Do.	Charles O'Donnell,	1827, May 1								
*29 to 30	Bridges, No. 33, 34, and 35.	Alexander M'Hargue,	1826, Nov. 30								
31 & 32	Culvert.	Charles O'Donnell,	1827, May 1								
30	Culvert, and French drain.	Phil. L. Hays,	July 9	16							
	Bridge, No. 33.	Do.	Do. 9	10							
	Tarpsack.	Samuel Pettit,	Aug. 1								
	Sundry jobs.	Do.									
	Bridges, No. 33 & 34.	Do.									
33 & 37	Bridge, No. 34.	Philip L. Hays,	Oct. 15								
	Canal.	Alexander M'Hargue,	July 31								
	House, near do.	George Shaw,	Sept. 17								
31	Aqueduct.	Henry Bodmer,	July 10								
32	Do.	A. L. Beaumont & Co.	1826, Dec. 29		80						
	Canal.	Michael Holman,	1827, March 26								
		A. L. Beaumont & Co.	Sept. 1								
*33 & 34	Bridges, No. 35, 37	Michael Holman,	1826, Nov. 11								
	Culvert.	Philip Duransey,	1827, July 28		10						
	Bridges, No. 39 to 43.	Geo. W. Sanford,	1826, Nov. 11								
35 & 37	Do. No. 39 & 40.	Philip Duransey,	1827, July 10								
36 & 37	Canal.	A. L. Beaumont,	1826, Dec. 9								
37	Canal.	Michael Holman,	1827, Oct. 3	Est. Eng.	10	50					
39	Canal and bridge.	Philip Smith,	June 5								
40	Canal.	Do.	July 11								
	Canal.	L. Lodge,	Sept. 2		175						
	Aqueduct.	Do.	Dec. 21								
41	Canal.	Ell Russell,	May 17								
	Do.	A. L. Beaumont,	July 11		*50						
	Bridges, No. 36.	Nicholas Malson,	July 11								
	Do.	Do.	July 11								
*41 to 47	Bridges, No. 36 to 43.	Samuel Hopkins,	Nov. 11								
	Do. No. 36 to 44.	Do.	Nov. 11								
	Road.	Do.	1827, Aug. 13								
	Culvert.	Do.	Dec. 12								
	Removing house.	George Sanford,	Oct. 24								
43	Culvert.	Ell Russell,	June 5		25						
44	Canal.	L. Lodge,	July 11								
47	Double lock.	Beaumont & Co.	Sept. 17		100						
	Bridge, No. 41.	M. J. Roark & W. Johnston,	Nov. 11								
	Cost iron for the works.	John S. Wiedling,	June 6								
Division	Wrought iron for the bridges.	Joel Bailey,	Oct. 29								
Do.											

Those marked thus (*) were reported last December, but being comprised within the legal year, are here repeated.



stone, taken from the bed of the canal and sold to bridge contractors, and rent for the Parson farm, have brought small sums of money into my hands, which I first appropriated to the payment of work upon the canal, taking credit for the same, in my account with the state. The accounting officers decided, that I could not be allowed these credits, but must pay the money directly into the state treasury. Part of this money has accordingly been paid over in this way. But, on reflection, I have thought, that if there is no law appropriating such moneys to canal purposes, there is none directing them to any other use; and as it is evidently right, that all the revenue which may be produced, by the expenditure of canal funds, should be used in aid of those funds, I have been led to make this suggestion.

Very respectfully,

C. MOWRY, *Acting Canal Commissioner.*

*Pennsylvania Canal Office, }
Harrisburg, Dec. 20, 1827. }*

B. 1.

“List of the names of all superintendents, engineers, assistant engineers, and clerks, employed ‘on the eastern division of the Pennsylvania canal,’ with the amount of wages or salary of each.”

Samuel H. Kneass,	} Assistant engineers at sixty dollars a month, commencing 7th of May, 1827.
George Merrick	
Emerson M’Ilvaine,	
William Rodrigue,	

Frederick W. Leopold, clerk, at \$2 a day, when actually employed on this division.

Robert Faries,	} Target men, at \$1 50 a day from May 7, 1827.
Charles L. Schlatter.	

William Groves, superintendant of masonry, at \$3 per day.

On the 15th of September, 1827, Emerson M’Ilvaine and Charles L. Schlatter, were transferred to the Delaware division—and on the 16th, Robert Faries was appointed assistant engineer; at \$60 a month, and thus the corps remained, until the first Monday in November, 1827.

*Pennsylvania Canal Office, }
Harrisburg, Nov. 5, 1827. }*

B. 2.

List of the names of all superintendants, engineers, assistant engineers and clerks, employed on the Susquehanna division of the Pennsylvania canal, with the amount of wages or salary of each.

Hother Hagi, assistant engineer, at sixty dollars a month, from May 31, 1827,

F. H. Petrie, do. do. do.

John A. Byers, do. do. July 3d.

Frederick W. Leopold, clerk, at \$2 a day, when actually employed on this division.

James Warford, target man, at \$1 50 a day, from May 31, 1827,

Franklin Wright, do. do. do.

J. H. Hopkins, do. do. July 4th.

William T. Baker, in making the surveys on the eastern bank of the Susquehanna, from the 1st to the 24th of June, 1827, inclusive, at \$1 50 a day.

The following persons were employed as chain men and axe men, some constantly and others occasionally, during the location of the canal, at the rate of \$1 a day, each:

James Wilson, John H. Hopkins, William Petrie, Michael Bower, jun. Leonard S. Woodward, Wm. T. Baker and N. Boyer.

The regular establishment, since September, is as follows:

Assistant Engineers.	Hother Hagi,	} At \$60 a month,
	F. H. Petrie,	
	John A. Byers	

Clerk. F. W. Leopold, at \$2 a day, when actually employed on this division:

Target men.	John H. Hopkins,	} At \$1 50 a day.
	Franklin Wright,	
	James Warford,	

Chain men.	George R. Mowry,	} At \$1 a day.
	William Petrie,	
	Julius Jeger,	

Axe men.	Michael Bower, jr.	} At \$1 a day.
	Isaac High.	
	Richard Lloyd,	

Charles Sanford, John Bower and Francis Peebles, were employed, for short periods, to fill vacancies, who received the wages of those whose places they filled.

*Pennsylvania Canal Office, Liverpool, }
November 5th, 1827.*

C.

* Statement of the amount of damages agreed to be paid to individuals, or assessed in favor of individuals, against the state" on the eastern division of the Pennsylvania canal, "during the year preceding the first Monday in November, 1827.

Cash paid.

1826.

* Nov. 21.	To George Fisher and Samuel Douglas, Esqrs. as counsel fees in damage cases,	\$200
* Dec. 19.	George Parson for a barn in the track of the canal, on section, 27,	225
* " 26.	Jacob Hise and John Lowman for a lot of ground, in Swatara township, nearly cut up by section 30,	180
" 29.	George Parson for injury done his crops by making canal on section 27,	21 25

1827.

Jan. 12.	Abr. M'Clure for stoppage of mill, &c. on section 32,	100
" 13.	W. B. Galbraith for injury to grass crop, on section 31,	12 50
April 10.	John Buffington for a stable on R. Fulton's property, on section 32,	30
" "	Ditto for injury done to crops and removing fence on same section	20
" "	Amos Griest for removing a stable on P. Keller's property, on section 30,	15
" 12.	Henry Beader for 80 feet of copper pipe, laid down on section 10th, to convey the water from Christian Gross's spring,	27
" 28.	To Ziegler and Lingle, for removing fence and lumber out of part of their board yard, and for the temporary use of said yard, while making the canal and works therewith connected, through the same up to the 1st day of March, 1828,	75
May 1.	Peter Keller for removing and putting up fence on section 30,	2 35
* 10.	George Parson for his property in Susquehanna township, on section No. 26 and 27,	1,754 50
12.	Amos Griest for removing and re-building a house on the estate of Peter Wenrich, deceased, on section 27,	145
* 15.	Peter Brenner for a lot of ground, and damages to another lot, in Swatara township, by section 36,	600
June 14.	Martha Peacock for a crop of potatoes destroyed by section 19,	8
July 16.	Robert Harris for injury to fences and crops by section 30,	15

Oct. 23	“ “ John B. Cox for a shed destroyed by section 22,	20
	George Banford for removing a house on section 41,	20
“ “	W. Grimshaw for altering fences on section 32,	10 00
		<hr/>
		\$3,480 60

1827.

Assessed.

Sept. 15th, In favor of Christian Gross on section 10, 650

Oct. 23. Do. George Fisher, Esq. do. 47, 530

*Pennsylvania Canal Office,**Harrisburg, Nov. 5, 1827.*

The items marked thus (*) being five in number, and amounting to \$2961 50 were reported last December, but falling within the year preceding the first Monday in November, and four of them having been paid since that date, are again reported. Two of them are reduced in amount.

No. 2.

To the Board of Canal Commissioners of Pennsylvania.

GENTLEMEN,

I have the honour to submit the following report upon the state of the work on the eastern division of the Pennsylvania canal.

At the outlet at the Swatara and junction with the Union canal, the work is far advanced towards completion; the two locks at that point are founded and have a number of courses laid, and the materials being all ready, but a short time will be required in the spring to complete them. The basin at the head of these locks is formed and the embankment connecting it with that of the Union Canal will be finished in the course of five or six weeks.

From the outlet up to the 15th. section, at the lower side of Kittatinny mountain, a distance of $15\frac{1}{2}$ miles, the work is completed with the exception of the 37th, embankment section at the limestone rocks, the 21st section, and the hanging of the gates, on four of the locks; all of which will be very shortly accomplished.

From the 15th section to the head of the division, at Clark's upper ferry the state of the work is as follows. Section 15 and 14 wall sections at Kittatinny mountain are far advanced, and will be finished early in the spring, together with the turnpike road adjoining. Between this point and the upper side of short mountain at the end of the 7th section, the only parts of the work unfinished, are the lock at Stony creek, which is very nearly up, and the aqueducts at Stony creek and Clark's, the abutments and piers of which are founded to the springing line and the materials principally ready. Section No. 7. will be finished during the winter. Sections No. 5 and 6, are completed; the upper lift lock together with sections No. 4 and 3, the latter the lower wall section at Peters mountain, will be completed early in the spring, and the upper wall sections, dam,

(1.)

al, from work done, amount thereof,
gineer,

RCHS.			No. of section.
Vall.	Sum total retained on each section.	Total pay- ments on each section.	
5,621	\$218 90	\$875 60	1
151	2722 10	17,658 58	3
206	315 14	1735 68	4
205	807 86	4433 84	5

Oct. 23	“ “ John B. Cox for a shed destroyed by section 22,	26
	George Banford for removing a house on section 41,	20
“ “	W. Grimshaw for altering fences on section 32,	10 00
		<hr/>
		83,480 60

1827.

Assessed.

Sept. 15th, In favor of Christian Gross on section 10, 650

Oct. 23. Do. George Fisher, Esq. do. 47, 530

*Pennsylvania Canal Office,**Harrisburg, Nov. 5, 1827.*

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Tabular statement of the progress of the work on the eastern division of the Pennsylvania canal, from opposite Duncan's island to the mouth of Swatara; showing each kind of work done, amount thereof, and payments made to contractors, on estimates of the engineer, up to, and inclusive of the 30th day of November, A. D. 1827.

No. of section.	Names of contractors.	CUBIC YARDS.						Grubbing.	Miscellaneous.	Cost of work estimated as done.	Retained until completion.	Payments made.	Total cost of each section.	Sum total retained on each section.	Total payments on each section.	No. of section.
		Earth.	Clay.	Rock.	Slate.	Embankment.	Fudding.									
1	Dam	Abbot Green and W. Cameron							2,200 perches of stone laid	\$1094 50	\$218 90	\$875 60				
3	Canal Lock No. 1	O. H. Dibble	29,001	15,400		18,084	15,621		Materials	\$18, -80 68	3422 10	16,438 58				1
		Do.								1900	500	1900				
4	Canal Bridge No. 1	Do.	17,958					8 10	36 feet lineal, of wood work	1616 22	315 14	1501 08				3
		Isaac M'Cord	510					151	Painting	424 60		424 60				
										10		10				
5	Canal	Murphy and Cowl, original contractors	7368					10		615 44	123 44	492				
		Anderson, M'Nance & Co. successors	25,451	90				120		5738 14	584 42	3043 72				
		M'Nance and Quinn				710				106 50		106 50				
	Bridge No. 2	M'Cord, Beaumont and Canfield	72			575		206	36 feet lineal, of wood work	553 78		553 78				
		Isaac M'Cord							Painting	10 10		10				
		Do.								227 84		227 84				
	Fences												2050 82	315 14	1735 68	4
6	Canal	R. and G. Orr, original contractor	152	1	5					12 66		12 66				
		Isaac M'Cord, successor	15,636			3614				2870 25		2870 25				
	Bridge No. 3	M'Cord, Beaumont and Canfield	34	151	299	975		205	36 feet lineal, of wood work	630 46		630 46				
		Isaac M'Cord							Painting	10 10		10				
		Do.								537 92		537 92				
	Fences												5861 29		5861 29	6
7	Bridge No. 4	Do.	150			456		312	36 feet lineal, of wood work	588 04		588 04				
		Do.							Painting	10 10		10				
		Do.								168 80		168 80				
	Fences												766 84		766 84	7
8	Canal	O. H. Dibble	22,250	29,000		28,090	17,649	250		25,046 47		25,046 47				
9	Canal	Do.	10,150	16,000		13,537	8292	150		12,894 14	644 71	13,249 43				
													25,646 47		25,646 47	8
10	Canal	George Barger and John Ryan	11,110	4950	11,110	2373				4306 67		4306 67				
		John C. Auld								68 68		68				
	Bridge No. —	Isaac M'Cord	60					68	36 feet lineal, of wood work	487 20		487 20				
		Do.							Painting	10 10		10				
													4671 87		4671 87	10
11	Canal Culvert	Ross and M'Fadden	28,008	2896		4000				4063 64		4063 64				
		Do.		250	486					271 50		271 50				
		Isaac M'Cord				590	496	160	32 feet lineal, coping	702 73		702 73				
		Do.								210 80		210 80				
	Fences												5548 60		5548 60	11
12	Canal Culvert	Hamil and M'Cord	15,270			2512	7565	547	7562 cubic yards, bard-pan	5376 30		5376 30				
		Isaac M'Cord			262		500	118	32 feet lineal, coping	691 25		691 25				
		Do.								156 80		156 80				
	Fences												6224 35		6224 35	12
13	Canal Aqueduct	Christian Gleim	10,369	665		3369		1908		5683 77	43	3640 77				
		L. Hodge	135													
									Materials	8 77 50						
										1866						
	Lock No. 2	Hodge and Gay	2520	50				900	Do.	1943 50	537 45	1405 05				
		Isaac M'Cord								5653 30	276 26	5289 04				
	Fences									154 88		154 88				
14 & 15	Canal Bridge No. 5	Beaumont & Co.	9398	10,176		31,907	8207	28,136	300	35,219 21	2040 53	31,178 68				
		Isaac M'Cord.							Painting	10 10		10				
													11,347 45	856 71	10,490 74	13
													33,229 21	2040 53	31,188 68	14 & 15
Carried to sheet 6.		198,602	77,609	14,674	115,645	9750	73,682	21288 00	Carried to sheet 6.				\$133,158 61	\$7,005 98	\$12,552 06	

4 and 3,
be compl

No.

... in the spring, and the upper wall sections, dam,

No. of section.	rs. l.	Grubbing	Total payments on each section.	No. of section.
16	Ca8 Ac0			
	Cu			
	Br5			
	Br5			
			810,871 96	16
17	Ca Br	810		
	5		2782 94	17
18	Ca5 Lo0 Br6	35		
			12,564 22	18

4 and 3, t
be complet
No. 1 mountain, will
in the spring, and the upper wall sections, dam,

No. of section.	Names of contractors.	CUBIC YARDS.						Wall.	Grubbing.	Miscellaneous.	Cost of work estimated as done.	Retained until completion.	Payments made.	Total cost of rock section.	Sum total retained on each section.	Total payments on each section.	No. of section.
		Earth.	Clay.	Rock.	Slate.	Embankment.	Put-ting.										
16	Canal Aqueduct	Corbett and Hays	41,542	7050	850		5960	408		4162 cubic yards, hard-pan	\$450 78	\$300	\$450 78				
	Culvert	Hodge and Guy Philip L. Hays J. Spink	75		534			1530		Clearing water-way	4650		4650				
	Bridge No. 6	Isaac Updegrave								242 cubic yards, hard pan	427 20	31 36	405 84				
	Bridge No. 7	M'Cord, Beaumont and Canfield Corbett and Hays					401	155		Wooden trunk	175		175				
		M'Cord, Beaumont and Canfield Philip L. Hays					1080	525		36 feet, lineal, of wood work	389 30		389 30				
											59 44		56 14				
											650	96 40	535 60				
											270	54	216				
17	Canal	Hays and Williams	7041	2631	858		90 7		8 D	3242 cubic yards, hard-pan	2182 14		2182 14				
	Bridge No. 8	Isaac Spink					1 20			36 feet, lineal, of wood work	171 60		171 60				
		M'Cord, Beaumont and Canfield						175			429 20		429 20				
18	Canal	John Lafferty	6715	2561	985		3213		35	3212 cubic yards, hard-pan	2538 49		2538 49				
	Lock No. 5	Hodge and Guy	2577		767		900			Materials, 54 52 10	9900 55	496 02	9404 55				
	Bridge No. 9	M'Cord, Beaumont and Canfield					206			36 feet, lineal, of wood work	491 20		491 20				
		Isaac M'Cord								Painting	10		10				
19	Canal	Midler & Co.	5344	5456	750		4421		60		2182 24		2182 24				
	Culvert	U. Wickware	533								75 95	15 99	63 96				
	Bridge No. 10	Midler & Co.	20				1280				2		2				
		J. Spink						143		36 feet, lineal, of wood work	320		320				
	Fences	M'Cord, Beaumont and Canfield								Painting	564 20	75 04	592 16				
		Isaac M'Cord									10		10				
		Do.									199 68		199 68				
50	Canal	U. Wickware, original contractor	8098	916	145		463				1045 64	167 96	877 68				
	Bridge No. 11	Robert Williams, successor	600					236 1			90	18	72				
		M'Cord, Beaumont and Canfield					1550			36 feet, lineal, of wood work	572		572				
	Fences	Robert Williams								Painting	367 50		367 50				
		Isaac M'Cord									10		10				
		Do.									993 36		993 36				
21	Canal	U. Wickware	10,320		250		2943		200		1765 16	244 60	1520 56				
	Bridge No. 12	Isaac M'Cord								Painting	10		10				
22	Canal	M-Langblin and Bradley	15,797		5024		5586				5474 94	20 03	5454 91				
	Fences	Isaac M'Cord									48		48				
23	Canal	O. Hartwell, original contractor	2801		50		600				411 85	137 43	274 42				
	Bridge No. 13	Edward O'Friel, successor	11,199			1592	2593				2141 90		2141 90				
		Do.					864				120 96		120 96				
		P. Provost, and M. and W. Byrne						168		Ded. for stone taken from the bed of canal, 8490 42							
	Bridge No. 15	Thomas and R. English						746		Wood work, and painting	378 67		378 67				
		Edward O'Friel									104 44		104 44				
		P. Provost, and M. and W. Byrne						166			8415						
										Ded. for stone taken from the bed of canal, 41 50							
		T. and R. English								Wood work, and painting	373 50		373 50				
											67		67				
24	Canal	Midler & Co. and J. Mirick	8482	5668	815	7867	1210	286			4632 81		46 2 81				
	Bridge No. 16	P. Provost, and M. and W. Byrne						177									
										Deducted for stone, 44 23							
											398 25		398 25				
		J. Mirick					1993			Wood work, and painting	399		399				
	Bridge at creek	T. and R. English									67		67				
	Fences	J. Mirick						65			90		90				
		Isaac M'Cord									553 36		553 36				
		Carried to sheet 6.	91,542	24,468	8018	9459	26,136	7055 1	2365	Carried to sheet 6.				5940 42	81561 18	246,102 81	24
														847,663 99			

1840	Jan 1	to Jan 31	1841
1841	Jan 1	to Jan 31	1842
1842	Jan 1	to Jan 31	1843
1843	Jan 1	to Jan 31	1844
1844	Jan 1	to Jan 31	1845
1845	Jan 1	to Jan 31	1846
1846	Jan 1	to Jan 31	1847
1847	Jan 1	to Jan 31	1848
1848	Jan 1	to Jan 31	1849
1849	Jan 1	to Jan 31	1850
1850	Jan 1	to Jan 31	1851
1851	Jan 1	to Jan 31	1852
1852	Jan 1	to Jan 31	1853
1853	Jan 1	to Jan 31	1854
1854	Jan 1	to Jan 31	1855
1855	Jan 1	to Jan 31	1856
1856	Jan 1	to Jan 31	1857
1857	Jan 1	to Jan 31	1858
1858	Jan 1	to Jan 31	1859
1859	Jan 1	to Jan 31	1860
1860	Jan 1	to Jan 31	1861
1861	Jan 1	to Jan 31	1862
1862	Jan 1	to Jan 31	1863
1863	Jan 1	to Jan 31	1864
1864	Jan 1	to Jan 31	1865
1865	Jan 1	to Jan 31	1866
1866	Jan 1	to Jan 31	1867
1867	Jan 1	to Jan 31	1868
1868	Jan 1	to Jan 31	1869
1869	Jan 1	to Jan 31	1870
1870	Jan 1	to Jan 31	1871
1871	Jan 1	to Jan 31	1872
1872	Jan 1	to Jan 31	1873
1873	Jan 1	to Jan 31	1874
1874	Jan 1	to Jan 31	1875
1875	Jan 1	to Jan 31	1876
1876	Jan 1	to Jan 31	1877
1877	Jan 1	to Jan 31	1878
1878	Jan 1	to Jan 31	1879
1879	Jan 1	to Jan 31	1880
1880	Jan 1	to Jan 31	1881
1881	Jan 1	to Jan 31	1882
1882	Jan 1	to Jan 31	1883
1883	Jan 1	to Jan 31	1884
1884	Jan 1	to Jan 31	1885
1885	Jan 1	to Jan 31	1886
1886	Jan 1	to Jan 31	1887
1887	Jan 1	to Jan 31	1888
1888	Jan 1	to Jan 31	1889
1889	Jan 1	to Jan 31	1890
1890	Jan 1	to Jan 31	1891
1891	Jan 1	to Jan 31	1892
1892	Jan 1	to Jan 31	1893
1893	Jan 1	to Jan 31	1894
1894	Jan 1	to Jan 31	1895
1895	Jan 1	to Jan 31	1896
1896	Jan 1	to Jan 31	1897
1897	Jan 1	to Jan 31	1898
1898	Jan 1	to Jan 31	1899
1899	Jan 1	to Jan 31	1900

D

(3.)

PROC				
<i>Pud- ling.</i>	<i>Cost of Won.</i>	<i>Sum total retained on each section.</i>	<i>Total payments on each section.</i>	<i>No. of section.</i>
	1			
	1			

No. of section.	Names of contractors.	CUBIC YARDS.							FEET.		Miscellaneous.	Cost of work estimated as done.	Retained until completion.	Payments made.	Total cost of each section.	Sum total retained on each section.	Total payments on each section.	No. of section.
		Earth.	Clay.	Rock.	Slate.	Embankment.	Put-ting.	Wall.	Grubbing.									
Canal Bridge No. 17	Beaumont & Co. P. Provost, and M. and W. Byrne	13,931		215	17,637			179	853		8447 50 Ded. for stone taken from the bed of canal, 44 75	83860 60	81173 91	84095 69				
Bridge No. 18	Beaumont & Co. T. and R. English P. Provost, and M. and W. Byrne					2176		188			402 75 435 20 67 8470 Ded. for stone taken from the bed of canal, 47		87 04	402 75 348 16 67				
Fences	Beaumont & Co. Kelsey and Gorman T. and R. English Isaac McCord					1150 279		60			423 238 193 50 67 349 69 Digging out foundation, 86 Wood work, and painting		47 60	423 190 40 193 50 67 349 69				
Canal Bridge No. 19	Midler & Co. P. Provost, and M. and W. Byrne	5277	4160	1636		9308					8652 50 Ded. for stone taken from the bed of canal, 65 25	2880 32		2880 32	28045 74	81308 55	6737 19	25 and 26
Fences	Ezra S. Dodd Isaac McCord					1758			261		587 25 489 50 87 37			587 25 439 50 87 37				
Canal Basin Luck No. 4	Midler & Co. Anderson, M'Namee & Co. W. and M. Byrne, and A. and P. Provost do.	11,608 2470	15,477	400 590 530		10,425 26,807 4994		791 2260 198	40 15		4056 88 3699 35 12,646 48 Ded. for stone taken from the bed of canal, 49 50			4036 88 3699 35 12,040 99	3994 44	3994 44	32	
Bridge No. 20	Ezra S. Dodd Thomas and R. English Isaac McCord George Schott					1671					445 50 534 20 67 163 48 168 Ded. for stone taken from the bed of canal, 49 50			445 50 534 20 67 163 48 168				
Fences Sundry jobs	Midler & Co. S. Lied George Schott Duck and Wolfersberger. Jonathan Leslie Charles O'Donnell Jonathan Leslie do.	8026	8123			5263			15		2265 40 4 105 14 90 12,898 57 109 671 1425 50 811 25 84 1 75 376 320 50 67 70 30			2265 40 4 105 14 90 12,312 82 109 671 1425 50 811 25 84 1 75 376 320 50 67 70 30	21,560 89	605 35	220,955 34	28
Canal Culvert	Charles O'Donnell David Strachen Daniel Miller Alexander M'Hargue Charles O'Donnell T. and R. English Isaac McCord	2770 872				2546		2843			354 cubic feet stone, coping Hauling and breaking stone Sundry jobs Lumber		585 75	12,312 82 109 671 1425 50 811 25 84 1 75 376 320 50 67 70 30				
Bridge No. 21	Charles O'Donnell David Strachen Daniel Miller Alexander M'Hargue Charles O'Donnell T. and R. English Isaac McCord					3345		16			354 cubic feet stone, coping Hauling and breaking stone Sundry jobs Lumber		585 75	12,312 82 109 671 1425 50 811 25 84 1 75 376 320 50 67 70 30				
Small bridge Bridge No. 22	Charles O'Donnell David Strachen Daniel Miller Alexander M'Hargue Charles O'Donnell T. and R. English Isaac McCord					1776		188			354 cubic feet stone, coping Hauling and breaking stone Sundry jobs Lumber		585 75	12,312 82 109 671 1425 50 811 25 84 1 75 376 320 50 67 70 30				
Fences	Charles O'Donnell David Strachen Daniel Miller Alexander M'Hargue Charles O'Donnell T. and R. English Isaac McCord					1776		188			354 cubic feet stone, coping Hauling and breaking stone Sundry jobs Lumber		585 75	12,312 82 109 671 1425 50 811 25 84 1 75 376 320 50 67 70 30				
Canal Culvert	Midler & Co. do.	3609 734	6417			13,438		160		*145 66	*Including remov. of buildings 15,800 br. & 57 ft. ct. at. cap. 55 feet do.			2784 98 160 64 498 35 151 25 20 2567 972 75 42 1173 75 600	19,162 17	565 75	18,576 42	29
Small culvert Trench drain Bridge No. 23	Samuel Pettit Liet & Co. Midler & Co. Samuel Pettit Liet & Co. J. M'Laughlin Midler & Co. Samuel Holman	100					40				608 feet cut stone coping Wood work and painting		9	142 25 30 2567 972 75 42 1173 75 600				
	Carried to sheet 6.	55,042	132,177	3174	17,637	83,220	200	8266	2268 66		Carried to sheet 6.	29972 72	9	28063 72	252,763 24	20499 85	250,263 39	

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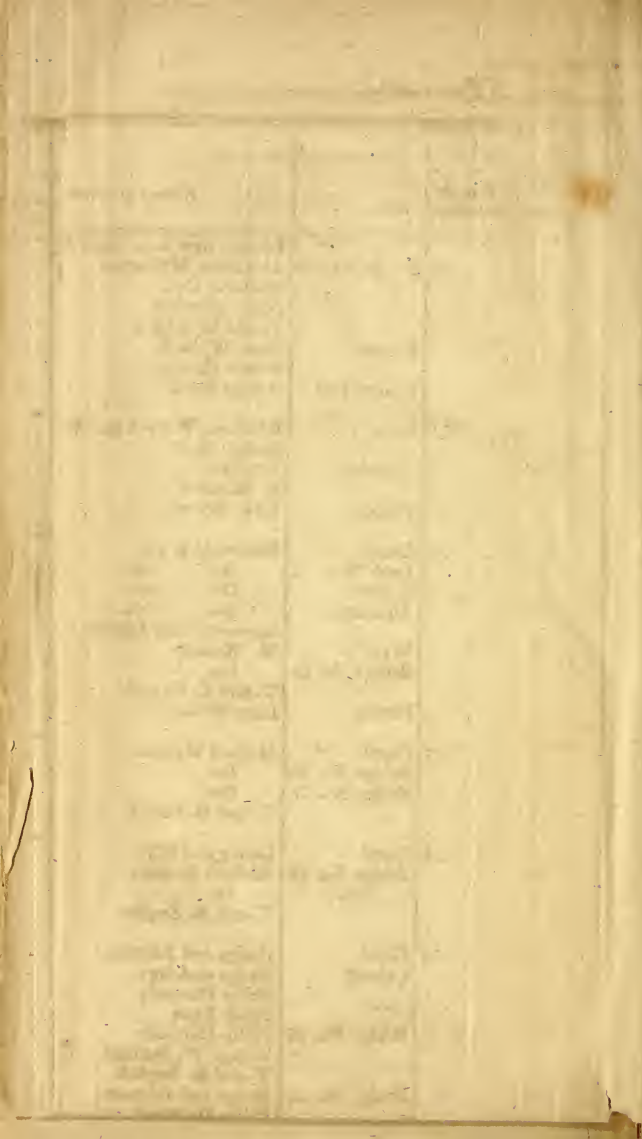
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(4.)

<i>Pud- dling.</i>	PRC	<i>Sum total retained on each section.</i>	<i>Total pay- ments on each section.</i>	<i>No. of section.</i>
	<i>Wd</i>			
	29			
	1			
	4	\$9	\$10,804 34	30
	8			
	7	947 69	10,004 08	31
823	21			
220	1			
	5			

1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	
					</																										

No. of section.	Names of contractors.	CUBIC YARDS.							PRICES.		Grubbing.	Miscellaneous.	Cost of work estimated as done.	Retained until completion.	Payments made.	Total cost of each section.	Sum total retained on each section.	Total payments on each section.	No. of section.	
		Earth.	Clay.	Rock.	Slate.	Embankment.	Puttling.	Wall.												
50	Bridge No. 24	Brought over from sheet No. 3.																		
	Alexander M'Hargue	100				1991		293			160 cub. ft. sand stone coping	889 72	89	889 72						
	Midler & Co.											852 50		852 50						
	David Strachen										15		511 75		511 75					
	T. and R. English											26		26						
	Isaac M'Cord											90		90						
	Fences											273 37		273 57						
	Sundry jobs											35		32						
51	Canal	Brackett, Watson and Bowen	8730			18,673			8 15			3374 99	516 38	2855 41	210,813 34	89	210,804 34	80		
	Aqueduct	George Shott				1100		825			Sundry jobs	36		36						
	Fences	L. Spink	1535								Materials,	7087 93	555 39	6732 36						
		H. Bodner										345 62	75 52	270 10						
		Isaac M'Cord										107 21		107 21						
52	Canal	Beamont & Co.	7456		700	23,761			128			4074 92		4074 92	10,951 77	947 69	10,004 08	51		
	Lock No. 6	Do. do.				1177		2135				10,363 84	435 69	9910 15						
	Culvert	Do. do.	100				823	151				794 08		794 08						
	Aqueduct	Do. do.	2229			3691	220	576				2712 45	100 80	2611 65						
	Wall	Lawrence and Johnson									For excavating foundation	45		45						
	Bridge No. 23	M. Holman						88				154		154						
	Fences	Do.						168			Wood work and painting	330	12	318						
		T. and R. English										67		67						
		Isaac M'Cord										144 75		144 75						
53	Canal	Michael Holman	16,936		43	1624			12			1035 46		1035 46	18,686 04	566 49	18,119 55	32		
	Bridge No. 26	Do.				750		190				412	43 40	368 80						
	Bridge No. 27	Do.						165				330	16 30	313 50						
		T. and R. English									Wood work and painting	67		67						
54	Canal	Lessig and Ely	12,115			1814			25			1333 03		1333 03	2764 46	59 90	2704 56	33		
	Bridge No. 28	Michael Holman				680						170	34	136						
	Do.	Do.						185				370	18 30	351 50						
		T. and R. English									Wood work and painting	67		67						
55	Canal	Hodge and Johnson	11,032		9	1854						1314 48	331 63	982 95	1940 03	59 50	1887 53	34		
	Culvert	Hodge and Guy									Materials	127 50	6 37	121 13						
		Philip Darmody	1145									114 50		114 50						
		Philip Egan	600									90	18	72						
	Bridge No. 29	Philip Darmady				827						115 78		115 78						
		George W. Sanford									Materials	340 88	8 34	332 54						
		T. and R. English						128			Wood work and painting	67		67						
	Bridge No. 30	Hodge and Johnson				403						56 42	17 73	38 69						
		Philip Darmody				1571						205 65		205 65						
		George W. Sanford						1022				396 98	18 85	378 13						
	Fences	Isaac M'Cord										185 80		185 80						
	Bridge No. 30	T. and R. English									Wood work and painting	67		67						
56	Canal	Beamont & Co.	7843			12,523			00			2377 06		2377 06	3681 99	400 82	2681 17	35		
	Bridge No. 31	G. W. Sanford						18			Materials,	230 28	11, 51	218 77						
	Fences	Isaac M'Cord										155 20		155 20						
															2762 34	11 51	2751 03	36		
57	Canal	Beamont & Co.	700			29,037			65			3901 54	780 36	3121 48						
	Culvert	Michael Holman						35				70	5 50	66 50						
	Bridge No. 32	Beamont & Co.						115			Materials,	310 75	15 54	295 21						
		George W. Sanford						160				447 60	22 38	425 22						
		T. and R. English									Wood work and painting	67		67						
		Carried to sheet 6.	70,521		754	101,316	1043	3372	3355 00		Carried to sheet 6.				4797 18	821 78	3975 41	37		
															255,797 36	2809 69	252,927 67			



<i>No. of section.</i>		<i>Names of contractors.</i>
38	Canal Fences	M ^c Laughlin and Bradley Isaac M ^c Cord
39	Canal Bridge No. 33	Philip Smith George W. Sanford
	Bridge No. 34	Philip Smith T. and R. English
	Fences	George W. Sanford T. and R. English
40	Canal Aqueduct	Isaac M ^c Cord
	Bridge No. 35	L. Hodge Eli Russell
		L. Hodge George W. Sanford



No. of section.		Names of contractors.	COSTS.							Grubbing.	Miscellaneous.	Cost of work estimated as done.	Retained until completion.	Payments made.	Total cost of each section.	Sum total retained on each section.	Total payments on each section.	No. of section.
			Earth.	Clay.	Rock.	Slate.	Embankment.	Pudding.	Well.									
38	Canal Fences	M. Laughlin and Bradley Isaac M'Cord	15,307		35		433				51406 30 381 39		51406 50 381 39			51847 09	51847 69	38
39	Canal Bridge No. 33	Philip Smith George W. Sanford	15,768		42½		756	209½			1725 93 410 30 59 65	830 52	1725 95 323 74 58 65					
	Bridge No. 34	T. and R. English George W. Sanford	30				371		116½	Wood work, and painting	67 228	11 40	67 216 60					
	Fences	T. and R. English Isaac M'Cord								Wood work, and painting	67 390 08		67 390 08					
40	Canal Aqueduct	L. Hodge Eli Russell	12,010		205		1100		8175		1501 40 506 75		1501 40 506 75		2946 98	531 92	2915 06	39
	Bridge No. 35	L. Hodge George W. Sanford	627				773	625 66			1675 129 36	271 87 6 47	1605 13 123 89					
	Fences	P. and R. English Isaac M'Cord								Wood work, and painting	67 20		67 80					
41	Canal Culvert	Benamont & Co. Samuel Hopkins	16,825		100		1500		8		1865 50 65	561 10	1444 40 65		4099 51	276 34	3821 17	40
	Turpikes	Do. do.								Stone work, 3½ rods	530		530					
	Bridge No. 36	Do. do.						190			470	23 50	445 50					
	Bridge No. 37	Benamont & Co. Samuel Hopkins	100				1111				176 75		176 75					
	Fences	Michael Malone Isaac M'Cord					520	115			530 88 40 58 10	11 50	518 50 88 40 58 10		3415 75	296 10	3017 55	41
42	Canal Culvert	Hodge and Johnson Eli Russell	12,785				3272		175		1843 77 210 41		1843 77 210 41					
	Fences	Samuel Hopkins Isaac M'Cord	777				101		90		247 50 183 44	12 38	235 12 183 44		2485 12	12 38	2472 74	42
43	Canal	F. Gallagher, original contractor, and his administrator.	2579						29 53		315 02		315 02					
	Bridge No. 38	M. Vey and H. Gallagher, successors	10,965				3673		14 67		1771 77 120		1771 77 105					
	Fences	Samuel Hopkins Isaac M'Cord						30		Materials, \$60	124 48	15	124 48		2329 27	15	2314 27	43
44	Canal Fences	L. Hodge Isaac M'Cord	11,256		100	800	1000		66 67		1577 27 281 64	557 13	1230 14 281 64		1858 91	357 13	1301 78	44
45	Canal Bridge No. 40	Midler & Co. Samuel Hopkins	9399½	2937	1126½		3170				2236 04 00	198 98 12 -	2053 00 49		2681 78	194 98	2456 80	45
	Fences	Isaac M'Cord								Materials	335 74		335 74					
46	Canal Bridge No. 41	Midler & Co. Samuel Hopkins	15,850		2160		1210		169		2925 90 338		2925 20 338					
	Bridge No. 42	John Armstrong Samuel Hopkins					975		160		117 320		117 320					
	Fences	John Armstrong Isaac M'Cord					1520				182 40 186 80		182 40 186 80		4069 40		4069 40	46
47	Canal & Basin	Beaumont & Co.	17,977		1800	350	63 9		275		3668 07 8270 15	398 83 81 54	3669 24 8188 61		4069 40		4069 40	46
	Regulat. lock	Do.	1950					1800		Wood work of gates, \$150								
	Double lock	Do.	4603		895			1040		Materials and stone work, \$6593 80	390 306 60	13 12	376 88 306 80					
	Culvert	Do.	130				260	130 160										
	Bridge No. 43	Samuel Hopkins													21,224 27	1095 54	20,128 98	47
		Carried to sheet 5.	144,906½	2937	6464	1150	28,124	4900½	8743 67	Carried to sheet 6;					246,906 08	2338 19	244,567 49	

CUBIC YARDS.						PROCHS.
<i>Earth.</i>	<i>Clay.</i>	<i>Rock.</i>	<i>Slate.</i>	<i>Embankment.</i>	<i>Puddling.</i>	<i>Wall.</i>
13,397		35		433		
15,768		42 $\frac{1}{2}$		786		
30				371		209 $\frac{1}{3}$
						116 $\frac{1}{3}$
12,010		205		1100		
627				773		
						625
						66

(6.)

<i>as total d on the rubber divi-</i>		<i>Total pay- ments made on the eastern di- vision.</i>
743	81 19	\$1427 80
335	69 69	44,525 49
268	99 85	52,927 67
365	61 18	50,26 39
288	05 95	46,102 81
		125,552 06
000	17 86	\$320,798 72

P

CUBIC YARDS.						PRCHS.
<i>Earth.</i>	<i>Clay.</i>	<i>Rock.</i>	<i>Slate.</i>	<i>Embankment.</i>	<i>Puddling.</i>	<i>Wall.</i>
15,397		35		433		
15,768		42 $\frac{1}{2}$		786		
80				371		209 $\frac{1}{3}$
						116 $\frac{1}{3}$
12,010		205		1100		
627				773		
						625
						66

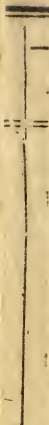
D. 1.—CONCLUDED.

(6.)

Names of contractors.	CUBIC YARDS.						FEET.		Miscellaneous.	Cost of work estimated as done.	Retained until completion.	Payments made.	Total cost of work done on the eastern division.	Surplus total retained on the eastern division.	Total payments made on the eastern division.
	Earth.	Clay.	Rock.	Slate.	Embankment.	Pudding.	Wall.	Grubbing.							
Joel Bailey									Irons for the bridges Do. of Geo. Pattison, Jr.	\$1404 06 23 25		\$1404 03 23 25			
Brought over from sheet	5	148,968½	2957	6464	1150	28,124	4900½	\$743. 67					\$1427 30		\$1427 30
" "	4	70,521		754		101,316	5372½	335					46,906 68	\$2381 19	44,525 49
" "	3	55,048	32,177	3171	17,697	89,526½	300	268 66					55,797 96	2869 69	52,927 67
" "	2	91,542	24,462	8018	9459	56,150	705½	365					52,763 24	2495 85	50,267 39
" "	1	198,602		77,609	14,674	113,645	9750	1288					47,663 99	1531 16	46,132 81
													133,158 01	7605 95	125,552 06
		564,670½	59,576	96,016	42,920	370,741½	10,993	99,223½	\$3090 38				\$437,716 58	\$16,917 86	\$454,634 44

E. and O. E.

Pennsylvania Canal Office, Harrisburg, Dec. 1, 1827.







Tabular statement of the progress of the work on the Susquehanna Division of the Pennsylvania Canal, between the mouth of Juniata and Northumberland point, shewing each kind of work done, amount thereof, and payments made to Contractors on estimates of the Engineer, up to and inclusive of December the 15th, 1827.

No. of Section.	Names of Contractors.	Cubic Yards.					Perches.		Sq. Yds.		MISCELLANEOUS.				
		Grubbing and draining.	Earth Excavation.	Embankment.	Puddling.	Solid rock.	Slide rock.	Hard pan.	Vertical wall.	Outer slope wall.	Inner slope wall.	Cost of work estimated on above computation.	Revised total computation.	Payments made.	Balance due.
5	McHargue & White,	Dol. Cts.	7640	1000		160		140							
6	Canlon & Co.	15	5910	150		30						843 80	154 40	709 40	
7	Bliss Russell,	200	5830			50		700				280 80	38 49	243 31	
8	John Ryan,	55	10118	2011		80						1302 74	128 10	604 64	
9	Bennett & Dougherty,	73	7034	3494		70						7686 64	173	1033 64	
10	Noland & Co.	30	9663	430		53		413				1214 74	169	1045 74	
11	Dodd & Co.	30	3094									1039 73	140	899 73	
12	Do.	30	8925	7461		30						330	64	236	
13	John Eick,	90	9500	6394		344		500				2410 55	348 32	4062 87	
14	John Seale,	100	2356	7968		270		154				1819	363 80	1453 20	
15	Samuel Hopkins,	170	150			33						2186 51	340 75	1833 76	
16	Chadwin, W. & S. Hunter,	130	10880			50		150				244 75	48 36	135 80	
17	J. & J. Murick,	55	206									300	40	160 00	
18	Woodward & Sanford,	65	3130	2150		277		100				33	11	44	
19	Do. & Do.	87 50	10673	13101		802						824 75	124 06	710 75	
20	Ritter & Co.	115 25	30	4204		1478						6767 73	1028 91	3738 84	
21	Provest & Co.	30										1189 40	139 83	1050 15	
22	William Sullivan,	70	2175			40						70	14	56	
23	Provest & Co.	240	9008									475 30	70 41	404 89	
24	Henry Walters,	10	1538									941 72	163 04	776 68	
25	Do.	40	3512	2383		691						165 80	32 76	131 04	
26	L. S. Woodward,	40	5512	1142		10						665 87	164 54	541 33	
27	Henry Walters,	5	5750									1165 80	253 80	912 00	
28	Allen & Co.	160	3993	7		0						441 25	47 55	393 70	
29	Joseph Foster,	80				22						506 80	79 01	427 79	
30	John Salmon,	40	1880									80	16	64	
31	Hiram Larnabee,	30										161 50	18 74	148 76	
32	Wilcox & Co.	85	1950	2504								30	10	40	
33	Nesbit & Co. (orig. contrs.	80	1090	199								548 65	109 61	438 44	
34	Benjamin Hale, (success'r.)	200										537 30	107 46	429 84	
35	S. Cameron & Co.	130	3554			61						80	16	64	
36	Ritter & Co.	180										585	87	238	
37	Leanna & Co.	80										468 32	64 57	403 75	
38	Stoughton & Wilcox,	180										180	46	144	
39	John Ryan,	80	4730			143		380				589 48	117 09	468 59	
40	John Wallis,	18	2079			95		30				647 45	92	555 45	
41	John P. Schuyler,	80	306			11						379 40	53 88	323 38	
42	Do.	85	1740			16						190 41	36 08	152 33	
43	John Wallis,	50	7653	400		100		200				102	30 40	81 60	
44	John Coker,	20	633									674 85	48 50	626 35	
45	Do.	20	4634			94						81 27	16 25	65 02	
46	Masley & Lotz, (orig. con.)	16	4767			54						478 60	68 36	416 24	
47	L. & G. Herald, (success'r.)	16	954			48						385 18	76 68	306 50	
48	Donel Spengberg, (success'r.)	10	1284									111 30	22 36	89 04	
49	Groves & Fox,	10	4 81	300								192 40	50 48	121 98	
50	John Forster,	1										64 01	75 00	567 95	
51	John L. Ayres,	150										150	38	128	
52	James Appleton,	100	4184	300		594						150	30	180	
53	Do.	175	1541									736 16	106 88	629 34	
54	Mathias J. App,	60	1469	300		380						380 25	75 05	304 30	
55	George Spencer,	60	3739	1740								235 92	51 18	204 74	
56	Lesig & Myers,	100	2446									695 72	104 44	585 28	
57	Cunningham & Co.	175	3430	480								284 45	38 84	244 61	
58	Morrow & Brady,	60										1113 95	204 01	911 04	
59	Do.	30	3800									60	13	48	
60	James Smith,	2000										384	32 49	291 51	
61	Martin Weaver,	90 50	4370									150	30	180	
62	McCord & Schuyler,	5	5432	363								720			
63	Dodd & Co.	130	400									1159 34	239 66	858 66	
64	Wynn & Bell,	60	8216									509 04	40 25	268 81	
65	J. M. Allen,	28	6000									130	26	104	
66	John Salmon,											50	10	40	
67	William Sternbergh,											892 60	92 48	820 12	
68	Wynn & Shannon,											562 00	77 15	484 87	
Payments of the four following December estimates not having been yet called for, they are not included above.		4397 73	21821 6	663 94	580	6 22	5 0	223 0		6761		42885 14	6775	6036109 54	
69	John Eick,		8800	5613		238				82		939 75			
70	Dodd & Co.	10	1400									115			
71	L. W. Snyder,	75	500									79			
72	Deardruff & Co.		463									120 66			
They swell the work to this amount,		4482 75	33881	7044 6	320	16 22	766	2236		6845		44140 45			

The return of hands upon this division, this day, is 922, and 49 teams.

Pennsylvania Canal Office, Liverpool, December 15th, 1827.



guard lock and pier head, are all commenced. On this part of the work very serious inconvenience and delay have been occasioned, by the continued high state of the river for two months past.

The following is the estimate of the cost of completing the division, viz.

Dam.—Base 50 feet, see area 174 feet, length 1750.=12,180 perches at 75 cts.	89195	
Abutments and wing on eastern and western sides, height 13 feet, average thickness 6ft. length 1400,=4368 perches at \$1.	4368	
Filling abutments with earth, 2800 cubic yds. at 25 cts,	700	
	<hr/>	14,263
Pierhead wall, and Guard lock, height 16 ft. average thickness 7, length 700, 3136 perches at 80 cts,	2508	
Filling with earth 3000 cubic yds at 30 cts.	900	
Guard lock with gates complete	9000	
	<hr/>	12,480
Sections No. 1 and 2, wall height 18 ft, average thickness 7, length 4200,=21,168 perches at 80 cts.	16934	
Embankment, see area 345 feet, length 4200 =53,666 cubic yds. at 30 cts	16099	
	<hr/>	33,023
Section No. 3, wall and embankment necessary for completion	7000	
Section No. 4. and lift lock,	11,055	
Section No. 7, excavation remaining 40,000 cubic yards at 11 cts.	4400	
Aqueduct at Clarks creek, stone work and embankment complete	8995	
Aqueduct at Stony creek, stonework and embankment	7000	
Lock at Stoney creek, stone work, gates and embankment	4690	
Sections No. 14 and 15, wall, embankment and turnpike road	9000	
Section No. 21, excavation	950	
Section No. 37, slope wall 1255 perches at 90 cts.	1129	
Basin at Swatara and junction with Union canal, embankment 4555 cubic yds, at 20 cts.	911	
Combined locks at the outlet, stone work, gates and embankment	11,466	
	<hr/>	
	Total \$	126,362

Respectfully submitted,

F. W. RAWLE, *Engineer,*

Harrisburg, December 19th, 1827.

No. 3.

To the Board of Canal Commissioners of Pennsylvania.

GENTLEMEN,

Having completed, agreeable to my instructions, the survey and explorations, of a route for a canal on the eastern and western bank of the Susquehanna river, I have the honor to report as follows:

The survey and exploration of the eastern bank was commenced on a level corresponding with the eastern division of the Pennsylvania canal at the upper reef of Foster's falls, and terminated at a point opposite the town of Northumberland.

The survey of the western bank was made from a point opposite Northumberland, to the line of the Juniata canal (as located by Mr. White) near Duncan's Island. It was considered unnecessary to continue this survey further, until the Juniata canal be finally located. If a junction of the Susquehanna and Juniata canal, is made at this point $20\frac{41}{100}$ feet above the contemplated dam at Foster's falls, there will be a saving of 24 feet of lockage, and about $1\frac{1}{4}$ miles of canal. The first $2\frac{1}{4}$ miles on the western bank are calculated to be made slack water navigation by constructing a dam at the Shamokin ripples, and a towing path along the shore.

In constructing a canal along the valley of the Susquehanna river, the most important difficulties to overcome, consist in procuring materials for, and constructing permanent embankments in the bed of the river round the rugged mountains which project to the waters' edge; and these difficulties exist in a much greater degree on the eastern than on the western bank.

In order to obtain a sufficient supply of water on either side of the Susquehanna river below Northumberland, it will be necessary to make a feeder on the river; which can be effected by making a dam at the Shamokin ripples, as suggested by Mr. Geddes.

If the canal should be located on the western bank of the river, a water communication can be easily made from the Shamokin creek to the canal, by a dam across the creek, and a lateral cut from the creek to the contemplated pond. If the canal was constructed on the eastern side of the Susquehanna, a considerable amount of tolls would probably be received from the transportation of the anthracite coal that is found on the head waters of Wiconisco, Mahantongo, and Mahanoy creeks; which would be excluded from a canal on the western bank. As this subject involves other considerations than the cost of making a canal, I respectfully submit it to the consideration of the board, and proceed to give particulars, and comparative estimates of the cost of making a canal on the eastern, and on the western side of the river.

The following estimates are made for constructing a canal 28 feet bottom, 40 feet water surface, and 4 feet deep. In estimating the cost of aqueducts and bridges, calculations are made for the abutments and piers to be built of stone, without mortar, with superstructures of wood—the culverts of stone, to be laid in cement.

Stone suitable for the construction of locks, will be very difficult to obtain, I shall therefore estimate the cost of stone at \$1,100 per foot lift. Locks may be constructed of wood, and rough stone, in such a manner that the principle timber in the sides may be prevented from decay, for \$1,800 per lock. Locks built in this manner may be prevented from decay, by keeping the timber immersed in water to the height of the water surface in the upper level. Such parts as cannot be constantly immersed, may be so constructed as to be easily detached and replaced anew in the winter season when the canal is not navigated. In making the survey on the western bank, the track of the canal was not exactly followed in all places, owing to the fields of grain, through which the line of canal could not be followed without causing unnecessary damage and delay, as it was known that at all such places there was suitable ground for the canal.

Eastern bank of the Susquehanna.

Mile 1. Commences at the upper reef of Foster's falls, and passes along the river at the base of Peter's mountain. Some rock excavation, and a road to be made above the canal the whole distance, a heavy embankment, protected by a strong slope wall, will be necessary, the stone for which are convenient. Earth for lining embankment difficult to procure. Locks No. 1 and 2 on this mile.

Embankment	124,960 cubic yds.	at 35 cts.	\$43,736 00
Excavation of rock,	5,896 do	60	3,495 60
Road,			2,183
Slope wall	14,960 do	75	11,220
Grubbing			350

\$6,984 60

Mile 2. The first twelve chains are similar to the last mile, then 35 chains of bottom land to lock No. 3; the remainder through swampy ground on the side of a stony ridge. Soil clay and gravel; one bridge required.

Excavation of earth	16,544 cubic yds.	at 11 cts.	\$1,819 84
do. rock	1,272 do	60	763 20
Embankment	18,124 do	25	4,531
Wall	2,196 do	75	1,647
Grubbing			280
Bridge			280

\$9,321 04

Mile 3. Crosses Powell's creek, where an aqueduct of one hundred and five feet will be required. Considerable embankment will be necessary near the creek, on the remainder of the mile. Excavation of a medium depth along a stony ridge—two farm bridges required. Lock No. 4, is located on the southern bank of the creek.

Excavation	14,644 cubic yds.	at 12 cts.	\$1,757 28
Embankment	7,676 do	15	1,151 40
Aqueduct			3,198

Bridges
Grubbing

360
70

\$6,736 68

Mile 4. Passes 24 chains along the bank of the river, on a narrow strip of bottom land, then 18 chains are crowded into the river by a ridge of high lands; on this distance a wall will be necessary; the remainder passes over good ground for a canal.

Excavation, Earth,	20,047 c yds,	at 10 cts.	\$2,004 70
do. rock,	879	do. 60 cts,	527 40
Embankment,	4,712	do. 18 cts,	848 16
Wall,	2,872	do. 75 cts,	2,154
Road,			350
Grubbing,			275

\$6,159 26

Mile 5. Commences near Read's Spring-House, which must be moved and the spring passed under the canal by a culvert. About 63 chains passes over favorable ground, and 37 round the point of a high bluff, where a heavy embankment, and some rock excavation must be made. A new road must be constructed above the canal about 40 chains distance.

Excavating earth,	13.545 c yds	at 11 cts,	\$1,489 95
do. rock,	1,563	do. 60 cts,	937 80
Embankment,	18,473	do. 25 cts,	4,618 25
Wall,	2,754	do. 75 cts,	2,065 50
Road,			1,000
Bridge,			280
Grubbing,			289
Culvert,			245

\$10,925 50

Mile 6. 43 chains must be made in the bed of the river, the remainder along a strip of bottom of only sufficient width for a canal; the road must be made above the canal the whole distance.

Excavation, earth,	1,1473 c yds	at 10 cts,	\$1,147 30
do. rock,	3,921	do. 60 cts,	2,352 60
Embankment,	54,739	do. 50 cts,	16,421 70
Wall,	7,482	do. 75 cts,	5,611 50
Road,			1,290
Grubbing,			392

\$27,215 10

Mile 7. Passes 36 chains in the bed of the river to Lock No. 5, then over tolerably good ground to the end of the mile. Two bridges and one culvert will be necessary. A new road must be made above the canal, and two small buildings moved.

Embankment,	45,756 c yds at 35 cts,	\$16,014 60
Excavating earth,	8,891 do. 10 cts,	889 10
do. Rock,	750 do. 60 cts,	2,250
Wall,	6,327 do. 75 cts,	4,745 25
Removing road, and buildings,		1,035
Bridges,		560
Culvert,		312

\$25,805 95

Mile 8. Passes the town of Halifax between the river and lower street, where a wall will be necessary on the upper side of the canal, to make room for the road between the buildings and canal. On the first 12 chains the line is crowded into the river by a ridge of high land, the remainder passes over good ground for a canal. Soil loam and gravel. Three bridges will be required.

Excavation,	24,297 c yds, at 12 cts,	\$2,915 64
Embankment,	3,764 do. 15 cts,	564 60
Wall,	3,132 do. 80 cts,	2,505 60
Bridges,		840

\$6,825 84

Mile 9. Crosses Armstrong's creek, which will require an aqueduct 140 feet in length; some embankment will be necessary, the stuff for which can be had from the extra cutting above lock No. 6. The remainder passes between the road and river along the slope of a stony ridge, through woods. Excavation hard and stony. Two bridges required.

Excavation,	29,092 c yards at 12 cts,	\$3,011 04
Embankment,	4,344 do 14 cts,	678 16
Aqueduct,		3,880
Bridges,		560
Grubbing,		260

\$8,389 20

Mile 10. The first 12 chains will occupy the road, and pass between Kinter's house and barn to Gerters run, which will require a culvert of 10 feet chord. The embankment across Gerters run can be had from the deep excavation before Kinter's house. From Gerters run the line passes between the road and river, on sideling ground, through woods. Two bridges required.

Excavation,	33,534 c yards, 12 cts,	\$4,024 08
Embankment,	7,695 do. 14 cts,	1,077 30
Culvert,		577
Bridges,		560
Grubbing,		320

\$6,558 38

Mile 11. Passes over stony ground on the slope of a ridge where excavation of a medium depth may be obtained. Some rock will probably be met with in the excavation. Three bridges required.

Excavation, earth,	17,692 c yards,	1½ cts,	\$9,123 04
do. rock,	320	do. 60 cts,	192
Grubbing,			160
Bridges,			840

\$9,515 04

Mile 12. Passes 56 chains over similar ground to the last mile to near Marsh's mill, where the canal will occupy all the low land and road 9 chains to lock No. 7. Three frame buildings to move, and 24 chains of road to make on the slope of the mountain. The last 15 chains of canal must be made in the bed of the river, and protected by a wall.

Excavation, earth	12,880 c yds at 10 cts,	\$1,288
do. rock,	945 do. 60 cts,	567
Embankment,	19,818 do. 37 cts,	7,332 66
Removing buildings and road,		1,523
Wall,	3,480 do. 75 cts,	2,610

\$13,320 66

Mile 13. Continues 24 chains along the base of the last mentioned mountain, where a road must be made above the canal, the stuff for embankment must be procured from an Island in the river. On the next 51 chains there will be a medium depth of excavation; 30 chains through woods, soil clay and gravel, the remainder mostly embankment. Lock No. 8 is near the termination of this mile. Two bridges required.

Embankment,	25,032 c yds at 40 cts,	\$10,012 80
do.	21,370 do. 16 cts,	3,419 20
Excavation, earth,	16,744 do. 12 cts,	2,009 28
do. rock,	1,753 do. 60 cts,	1,011 80
Wall,	5,628 do. 75 cts,	4,221
Road,		576
Bridges,		560
Grubbing,		240

\$22,090 08

Mile 14. Begins on the southern bank of the Wicanisco creek, which will require an aqueduct of 140 feet in length. Bed of creek 14 below bottom of canal. From Wicanisco creek to Shippies run there will be good excavation; the remainder passes along the foot of a stony ridge through woods. Four bridges required.

Excavation,	19,200 c yds at 12 cts,	\$2,313 60
Embankment,	2,163 do. 14 cts,	302 82
Aqueduct,		3,880
Bridges,		1,120

Grubbing,
Culvert,

\$ 90
312

\$8,018 42

Mile 15. Passes along the slope of a stony ridge, 30 chains require grubbing; soil clay and gravel. Three bridges and one culvert required.

Excavation,	21,671 c yds at 12 cts,	\$2,600 52
Embankment,	1,811 do. 12 cts,	217 32
Grubbing,		250
Bridges,		840
Culvert,		312

\$4,219 84

Mile 16. The first 27 chains passes over good ground for a canal, and the remainder along the base of Mahantango mountain: Rodger's ferry house must be taken down, and a road made above the canal. The stuff for embankment will be very difficult to procure, and hauled an average distance of $\frac{3}{4}$ of a mile. Lock No. 9, is on this mile.

Excavation, earth,	8,781 cub. yds. at 10 cents,	\$ 878 10
do. rock,	3,722 do. at 60	2,233 20
Embankment,	61,851 do. at 40	24,740 40
Wall,	8,480 do. at 75	6,360
Removing road and house,		2,209
Grubbing		360
Bridges,		560

\$ 37,540 70

Mile 17. Begins at the base of the Mahantango mountain, and extends throughout the whole distance along the river shore. Stuff for embankment must be procured from an island half a mile distant; some rock must be excavated, and a new road made the whole distance.

Embankment,	92,821 cubic yds. at 45 cents,	\$ 41,769 45
Wall,	12,325 do. at 75	9,243 75
Excavation, rock,	2,640 do. at 60	1,584
Road,		2,683
Grubbing,		320

\$ 55,600 20

Mile 18. The first 6 chains must be made in the river, then 45 chains passes along a narrow bottom, and occupy the site of the road to Dill's ferry house; the remainder runs between the road and river through woods, on sideling ground.

Embankment,	6,846 cubic yds. at 20 cts.	\$ 1,369 20
Excavation,	21,260 do. at 11	2,338 60
Wall,	918 do. at 75	688 50
Road,		714

Bridge,	230
Grubbing,	150

\$ 5,540 30

Mile 19. Passes on good ground for canal:—soil, clayey loam:—three bridges and one culvert will be required.

Excavation, 18,840 cubic yards at 11 cents;	\$ 2,072 40
Embankment, 5,351 do. 14	749 14
Grubbing,	237
Bridges and culvert,	1,085

\$ 4,143 54

Mile 20. Crosses Mahantango creek, which can be crossed by making a dam 10 feet high. A tow path bridge can be connected with the road bridge, across the creek; a guard lock will be required on the southern bank. Lock, No. 10, which is located on the northern bank, will supersede the necessity of a guard lock at that place. There will be extra excavation on the greatest part of this mile; two farm bridges will be necessary.

Excavation, 60,500 cubic yards, at 13 cents;	\$ 7,865
Embankment, 4,322 do. at 13	561 86
Dam, 270 feet in length;	4,420
Tow path bridge,	810
Two farm bridges;	560

\$ 14,16 86

Mile 21. The first 45 chains passes along the river shore, under a high bank of clay and gravel, where the stuff for embankment can be easily procured; the remainder passes along the foot of a high bluff of rocks, where the embankment will be difficult to procure. A wall will be required the whole distance.—One culvert will be necessary.

Embankment, 39,915 cubic yards, at 30 cents;	\$ 11,974 50
Excavation, 29,610 do. at 10	2,961
Embankment, 4,858 do. at 14	680 12
Wall, 3,850 do. at 75	2,887 50
Culvert,	382
Grubbing;	160

\$ 19,045 12

Mile 22. Passes throughout the whole distance along the base of a high rocky hill; stone for walling may be had from the hill, but earth for embankment must be procured from a distance averaging a mile.

Embankment, 91,760 c. yds. at 45 cents;	\$ 41,292
Wall, 12,288 do. at 75	9,216
Excavation, rock, 1,840 do. at 60	1,104

\$ 51,612

Mile 23. The first 48 chains passes along the river, at the base of the last mentioned hill, to lock No. 11, where bottom land commences; the remainder over good ground for a canal. One culvert and three farm bridges are necessary.

Embankment,	56,016	cub. yds. at 37 cents,	\$ 20,725 92
Excavation, earth,	8,052	do. at 10	805 20
Do. rock,	940	do. at 60	564
Wall,	6,038	do. at 75	4,528 50
Culvert,			245
Bridges,			840

\$ 27,708 62

Mile 24. Begins at Georgetown, runs near the bank of the river, and crosses Brosius' run. One culvert and three bridges will be necessary.

Excavation,	31,854	cubic yards, at 12 cents,	\$ 3,822 48
Embankment,	4,473	do. 12	536 76
Culvert,			567
Bridges,			840

\$ 5,766 24

Mile 25. Passes over good ground for canal; soil, loam and clay. Two bridges will be required.

Excavation,	20,184	cubic yards, at 10 cents,	\$ 2,018 40
Bridges,			560

\$ 2,578 40

Mile 26. On the first 33 chains there will be some extra cutting, which terminates at Blauser's run; the remainder passes along the river shore. Some earth for embankment may be obtained above Blauser's run. Stone will be difficult to procure. One bridge and one culvert necessary.

Excavation,	14,856	cubic yards, at 12 cents,	\$ 1,782 72
Embankment,	58,259	do. at 25	14,564 75
Wall,	6,561	do. at 87	6,578 07
Culvert,			450
Bridge,			280

\$ 23,655 54

Mile 27. The first 63 chains pass along a high rocky bluff, where an embankment must be made in the bed of the river, and a road constructed above the canal on the slope of the bluff; the remainder passes over good ground for a canal. Lock No. 12 is on this mile. One bridge necessary.

Excavation,	earth, 4,081	cub. yds. at 10 cents,	\$ 408 10
Do.	rock, 793	do. at 60	475 80
Embankment,	70,261	do. at 45	31,617 45
Wall,	9,456	do. at 80	7,564 80

Road,	1,440
Bridge,	280

\$ 41,786 15

Mile 28. Crosses Fiddle's run; about 18 chains will require embankment; on the remainder there will be a medium depth of excavation. An aqueduct, culvert and bridge, will be required.

Excavation	16,400 cubic yards, at 12 cents,	\$ 1,974
Embankment,	4,904 do. at 14	686 56
Aqueduct,		1,972
Culvert,		312
Bridge,		280

\$ 5,224 56

Mile 29. Passes over sideling ground, near the bank of the river; excavation of a medium depth may be obtained; soil, gravelly loam. Lock No. 13 is in this mile. One culvert will be required.

Excavation,	19,200 cubic yards, at 11 cents,	\$ 2,112
Culvert,		245
Grubbing,		240

\$ 2,597

Mile 30. The first 31 chains pass over good ground for a canal, to the southern bank of Mahanoy creek; thence an embankment in the bed of the creek, 36 chains, the stuff for which can be had from the opposite bank. An aqueduct 175 feet long required. From the aqueduct the line passes over low ground, which must be embanked 10 chains; the remainder passes over good ground for a canal. Two bridges will be necessary.

Excavation,	17,798 cubic yards, at 10 cents,	\$ 1,779 80
Embankment,	49,552 do. at 18	8,847 36
Wall,	5,421 do. at 80	4,336 80
Aqueduct,		4,546
Bridges,		560

\$ 20,069 96

Mile 31. Begins at the foot of a hill and passes 42 chains at the base, where an embankment three feet below bottom of canal will be required; the next 38 chains pass along the river at the foot of a rocky hill. This mile will occupy the road throughout the distance. Some rock to be excavated.

Embankment	23,646 c yards, at 15 cts,	3546 90
do.	38,941 do. 25 cts,	9,735 25
Excavation—rock,	1,272 do 60	763 20
Wall,	6,165 do 75	4623 75
Road,		1,682

\$20,351 10

Mile. 32. Crosses M'Cue's run, which will require an aqueduct 35 feet long; there will be some extra excavation and embankment required—three farm bridges necessary,

Excavation	30,312 c yards, at 13 cts,	3,940 56
Embankment,	5,958 do 15	893 70
Aqueduct,		1,972
Bridges,		840

\$7,646 26

Mile. 33. Passes Jones' ferry house and crosses Hollan run, which will require an aqueduct 35 feet long. A wall to protect the outside of the embankment will be necessary 50 chains; and considerable extra cutting incurred—one bridge will be required.

Excavation,	6,640 c yards, at 12 cts,	796 80
Embankment,	46,820 do 14	6,554 80
Wall,	7,561 do 80	6,048 80
Aqueduct,		1,972
Bridge,		280

\$15,652 40

Mile 34. Passes the whole distance along the bed of the river at the foot of a high rocky hill, where stuff for embankment and stone for a wall will be difficult to procure.

Embankment,	90,880 c yards, at 40 cts,	36,352
Wall,	12,485 do \$100	12,485
Excavation rock,	963 do 60 cts,	577 80

\$49,414 80

Mile 35. Continues along the last mentioned hill in the bed of the river: Stone for the wall, and some earth may be obtained from the hill; the remainder of the earth must be procured from Clark's Island, one fourth mile distant:

Embankment,	92,643 c yards, at 30 cts	27,792 90
Wall,	14,960 c do 75	11,220
Excavation rock,	1,387 do 60	832 20

\$39,835 10

Mile 36. The first 16 and six last chains will require embankment in the river; the remainder will be excavation of extra depth along the bank of the river near Bidding's tavern, a small run crosses the line which will require a culvert.

Embankment,	24,992 c yards, at 18 cts,	4,498 56
Excavation,	32,520 do 12	3,902 40
Wall,	3,850 do 80	3,080
Culvert,		245

\$11,725 96

Mile 37. Extends throughout the whole distance along the base of a high rocky hill, where an embankment must be made in the river with earth taken from an island opposite, about one half a mile distant.

Embankment,	90,281 c yards, at 40 cts,	36,912 40
Wall,	12,340 do \$1 00	12,340
Excavation, rock,	1,973 do 60 cts,	1,183 80
		<hr/>
		\$ 40,436 20

Mile 38. Passes along the river at the base of the last mentioned hill; a heavy embankment will be necessary, the stuff for which must be procured from a great distance, except a small portion which may be had from the hill near the middle of the mile.

Embankment,	86,740 c yards at 45 cts,	39,033
Wall,	13,856 do \$1	13,856
Excavation, rock,	732 do 40 cts,	292 80
		<hr/>
		\$ 53,181 80

Mile 39. Continues 30 chains along the river to the mouth of the Shamokin creek, then 50 chains up the creek along the base of the Shamokin mountain, will require embankment and wall the whole distance, and occupy the road 42 chains.

Embankment	77,924 c yards, at 20 cts,	15,784 84
Wall	11,360 do 80	9,088
Road		896
Bridge		280
		<hr/>
		26,948 84

Mile 40. Passes 12 chains along the last mentioned mountain to the site of the proposed dam and guard lock; then across a point of bottom land, occupying the site of a proposed mill race, to the mouth of a branch or gut of the Susquehanna, on the northern bank of Shamokin creek; then up said gut to the end of the mile. The towpath must be changed at the dam, and an embankment made above high water mark across the flat to the guard lock in the gut, and an embankment made from the lock to the high ground on either side.

Embankment	26,913 c yards at 14 cts,	3,767 82
Excavation	12,572 do 12	1508 64
Wall	1798 do 75	1,348 50
Dam		1886
Towpath bridge		689
Two farm bridges		560
		<hr/>
		\$ 9,759 96

Mile 41½. Passes along the gut through woods, over swampy ground 60 chains; then over dry ground to the Susquehanna river above the Northumberland bridge. There will be considerable

extra excavation on this mile. A guard lock and two farm bridges will be necessary.

Excavation	56,874 c yards 15 cts,	8,531 10
Bridges		560
Grubbing		400

89,491 10

RECAPITULATION.

Amount of excavation, embankment, &c.		\$830,324 30
Thirteen locks of wood and rough stone, at	\$1,800,	23,400
Four guard locks of do	1,500,	6,000
Dam at Shamokin ripples,		37,984
Waste wiers,		4,000
Twenty-five mile of fence,	480,	1,120
Embankment of locks and bridges,		7,627 50
Excavation of foundations for locks, aqueducts and culverts,		4,688 32

8926,144 15

Add ten per cent. for contingencies,

92,614 41

\$1,018,758 53

If stone locks should be adopted the total expense of constructing the above 41 and one-fourth miles of canal with 86 $\frac{41}{100}$ feet of lockage would be \$1,090,409 53.

Western bank of the Susquehanna.

Mile 1. Begins opposite the town of Northumberland, near the junction of the north and west branches; and passes along the base of a mountain; a tow-path must be constructed along the shore, and protected by a wall. Stuff for embankment and stone for the wall, may be procured along the slope of the mountain.

Embankment	26,378 cubic yds. at 15 cts.	\$3,956 70
Wall	12,293 do. 75	8,989 50

\$12,946 20

Mile 2. Is a continuation of the tow-path along the base of the last mentioned mountain.

Embankment	27,378 c. yds. at 15 cts.	4,106 70
Wall	12,293 do 75	9,219 75

\$13,326 45

Mile 3. Passes 22 chains along the river to the site of the proposed dam, where the slack water navigation terminates; the next 30 chains passes along the bank of the river, where the canal must be excavated, and the outside of the embankment protected by a wall; the remainder will be deep excavation on the bank of the river.

Excavation	63,886 c. yds. at 12 cts.	7,666 92
Embankment	9,240 do 15	1,386
Wall	10,155 do 100	10,155
		<hr/> \$19,207 32

Mile 4. Will be excavated of an extra depth, 21 chains of wall and 24 chains of grubbing will be necessary; one farm bridge required.

Excavation	96,720 c. yds. at 12 cts.	11,606 40
Wall	2,035 do 80	2,420
Grubbing		120
Bridge		280
		<hr/> \$14,426 40

Mile 5. Passes 33 chains near the bank of the river to a small run, where a culvert and some embankment will be required; the remainder along low ground between the road and river, where good excavation of a medium depth may be had; two bridges necessary.

Excavation	37,809 c. yds. at 12 cts.	4,537 08
Embankment	5,928 do 14	829 92
Culvert		312
Bridges		560
Grubbing		100
		<hr/> \$ 6,339 00

Mile 6. Passes 60 chains over swampy ground, through wood, and crosses the head race of Dewart's saw mill, which will require a culvert to pass the water to the mill; near the mill the line passes over low ground, which will require embankment. Two farm bridges will be necessary.

Excavation	19,072 c. yds. at 12 cts.	2,208 64
Embankment	6,844 do 14	958 16
Wall	733 do 100	733
Grubbing		480
Culvert		450
Bridges		560
		<hr/> \$ 5,389 80

Mile 7. Crosses an outlet of Penn's creek, where considerable embankment will be required across the outlet, to turn the water down the main channel; the embankment must be raised an extra height, and protected by a wall to guard against the high water of the creek; the line then passes along the eastern bank of the creek, on the Isle of Que—good ground for a canal; soil, sandy loam. Three bridges required.

Excavation	18,353 c. yds. at 10 cts.	1,835 50
Embankment	11,014 do 15	1,652 10
Wall	1,485 do 100	1,485
Bridges		840
Grubbing		48
		<hr/> \$ 5,860 40

Mile 8: Passes 32 chains over good ground for a canal, and 48 chains require embankment; one bridge necessary.

Excavation	7,616 c. yds. at 10 cts	761 60
Embankment	23,232 do 15	3,484 80
Bridge		280

\$ 4,527 40

Mile 9. Requires 30 chains of embankment: the remainder will be easy excavation; 39 chains grubbing; two bridges will be necessary.

Excavation	11,894 c. yds. at 10 cts.	1,189 40
Embankment	12,750 do 14	1,785
Bridges		560
Grubbing		300

\$ 3,834 40

Mile 10. Crosses Penn's creek, which requires an aqueduct of 210 feet in length; considerable embankment will be required, and may be easily procured; two farm bridges necessary.

Excavation	13,891 c. yds. at 10 cts.	1,389
Embankment	17,264 do 14	2,416 96
Aqueduct		5,292
Bridges		560
Grubbing		270

\$9,928 06

Mile 11. Passes along the slope of a high hill, through woods. An embankment must be made throughout the whole distance, the stuff for which may be procured between the canal and river; a new road must be made above the canal.

Embankment	45,051 c. yds. at 15 cts.	6,757 65
Excavation	7,526 do 12	903 12
Wall	3,454 do 75	2,590 50
Road		896
Grubbing		400

\$11,547 27

Mile 12. Occupies the site of the road—some rock will probably be met with in the excavation—40 chains of grubbing.

Excavation	22,757 c. yds. at 12 cts.	2,730 84
do. rock	700 do 60	420
Road		320
Grubbing		200

\$3,670 84

Mile 13. Continues along the road on the slope of the hill; excavation hard and stony—53 chains of grubbing; one bridge will be necessary. Lock No. 1, is at the termination of the mile.

Excavation of earth	18,740 c. yds. at 12 cts.	2,248 80
do rock	960 do 60	576
Embankment	4,782 do 15	717 30
Road		480
Bridge		280
Grubbing		265

\$4,567 10

Mile 14 Commences at Thorndon's tavern, and passes along the foot of a ridge, over bottom land where there will not be sufficient excavation to form the canal; one bridge required.

Excavation	9,765 c. yds. at 11 cts.	1,074 15
Embankment	18,041 do 14	2,524 74
Bridge		288
Grubbing		120

\$ 3,999 89

Mile 15. The first 21 chains will require embanking to lock No. 2; the remainder passes over good ground for a canal; 3 culverts and 2 bridges required.

Excavation	24,284 c. yds. at 10 cts.	2,428 40
Embankment	4,919 do 14	688 66
Culverts		1,449
Bridges		560
Grubbing		120

\$ 5,246 06

Mile 16. Crosses Herrold's run, which requires a culvert of 10 feet chord. The line passes along the bottom, at the foot of the high land; 3 bridges will be necessary.

Excavation	20,449 c. yds. at 10 cts.	2,044 90
Embankment	7,392 do 15	1,108 80
Culvert		569
Bridges		840

\$ 4,562 70

Mile 17. Passes 45 chains over good ground for a canal; soil clay and loam; and 35 chains along a narrow strip of bottom land near the river, where some rock must be excavated, and a wall made on the outer side of the bank. Two bridges required.

Excavation, earth,	1,1981 cub. yds. at 10 cents,	\$ 1,198 10
do rock,	4,551 do at 60	2,730 60
Embankment,	10,224 do at 20	2,044 80
Wall,	3,750 do at 100	3,750
Bridges,		560

\$ 10,283 50

Mile 18. Passes 51 chains along the road, near the bank of the river, to M'Kees falls; where there will be some rock excavation;

on the remainder there will be excavation of an extra depth, along the bank of the river. One bridge required.

Excavation earth,	35,704	cub. yds. at 12 cents,	\$ 4,284 48
do. rock,	2,608	do. at 60	1,576 80
Embankment	729	do. at 14	102 06
Wall	660	do. at 50	330
Bridge			280
Road			160
Grubbing			120

\$ 6,853 34

Mile 19. Passes over good ground for a canal throughout the whole distance. Three bridges and one culvert required.

Excavation	21,757	cub. yds. at 10 cents,	\$ 1,175 70
Bridges			840
Culvert			312

\$ 3,427 70

Mile 20. Crosses west Mahantango creek, which will require an aqueduct 275 feet in length; the line passes over good ground for a canal to the creek. From the aqueduct to lock No. 3 there will be a heavy embankment; the remainder passes over suitable ground. Two bridges will be required.

Excavation,	17,846	cub. yds. at 1 cents,	\$ 1,963 06
Embankment,	14,240	do. at 15	2236,
Aqueduc			4,546
Bridges and grubbing			704

\$ 9,349 06

Mile 21. Passes along low ground, at the foot of a ridge; some embankment necessary near Wilts run. One culvert and three bridges required,

Excavation,	21,786	cub. yds. at 10 cents.	\$ 2,178 60
Embankment,	1,739	do. at 12	208 68
Bridges,			840
Culvert,			569
Grubbing,			256

\$ 4,053 28

Mile 22. Passes over low ground at the foot of a steep ridge of high land, and terminates at a high rocky hill, where an embankment will be necessary. One bridge and two culverts required.

Excavation,	18,480	cub. yds. at 12 cts.	\$2,217 60
Embankment,	8,345	do. at 18	1,502 10
Wall,	867	do. at 75	650 25
Culverts			814
Bridge			280
Grubbing,			96

\$ 5,559 95

Mile 23. The first 27 chains pass round the point of the last mentioned hill; the remainder over a narrow strip of bottom.

Excavation, earth	4,492 cub. yds. at 11 cents,	\$ 494 12
do. rock,	1782 do. at 60	1,069 20
Embankment,	36,761 do. at 25	9,195 25
Wall,	4,674 do. at 75	3,505 50
Road,		900
Grubbing,		175

\$ 15,339 07

Mile 24. Passes over good ground for a canal, 18 chains of which are through woods. Lock No. 5. is on this mile. Two bridges will be required.

Excavation,	17,760 cub. yds. at 10 cents,	\$ 1,776
Embankment,	3,908, do. at 15	586 20
Bridges,		560
Grubbing,		100

\$ 3,022 20

Mile 25. Passes 36 chains over wet hard ground, through woods. The remainder will be good excavation. Two bridges necessary.

Excavation,	33,876 cub. yds. at 12 cents,	\$ 4,065 12
Bridges,		560
Grubbing,		180

\$ 4,805 12

Mile 26. Passes through Liverpool, between the road and river, along a stony ridge. Wild Cat creek which crosses the line, will require an aqueduct. One culvert and three bridges will be necessary.

Excavation,	21,756 c yds 12 cts,	\$2,610 72
Embankment,	8 942 do. 15 cts,	1,341 30
Aqueduct,		1,972
Culvert,		568
Bridges,		840

\$7,332 02

Mile 27. Passes over low stony ground along the road to lock No. 6, near Tharp's mill; the remainder over good ground for a canal. Two bridges required.

Excavation, earth,	23,122 c yds 11 cts,	\$2,543 42
do. rock,	516 do. 60 cts,	309 60
Embankment,	3,647 do. 15 cts,	547 05
Bridges,		560

\$3,960 07

Mile 28. Passes over suitable ground for a canal at the foot of a ridge, 48 chains through woods. Three bridges required.

Excavation	22,757 c yds at 10 cts,	\$2,275 70
Bridges,		840
Grubbing,		200

\$3,315 70

Mile 29. Crosses Ritner's run, which will require an aqueduct, and continues round Berries mountain. Lock No. 7, is located on this mile. 24 chains of road to make. One bridge required.

Excavation, earth	17,239 c yds at 11 cts,	\$1,896 29
do. rock	1,120 do. 60 cts,	672
Embankment,	27,940 do. 20 cts,	5,588
Wall,	4,620 do. 75 cts,	3,465
Road,		650
Aqueduct,		1,972
Bridge,		280
Grubbing,		100

\$14,623 29

Mile 30. Commences at Berries mountain, and passes along the road, on a narrow strip of bottom. A road must be made above the canal. 54 chains of wall necessary. One bridge required.

Excavation,	9,445 c yds 11 cts,	\$1,038 95
Embankment,	40,820 do. 18 cts,	7,347 60
Wall,	5,940 do. 75 cts,	4,455
Road,		1,150
Bridge,		280
Grubbing,		150

\$14,421 55

Mile 31. Passes along the slope of a stony ridge, and crosses a small run, where an embankment, and a culvert will be required. Two bridges necessary.

Excavation, earth	17,801 c yds at 12 cts,	\$2,136 12
do. rock	750 do. 60 cts,	450
Embankment,	7,185 do. 15 cts,	1,077 75
Culvert		312
Bridges,		560
Grubbing,		150

4,085 87

Mile. 32 Passes along the base of a high rocky hill, a wall necessary the whole distance. The stuff for the embankment on the first 42 chains can be procured from the slope of the hill. The remainder will be difficult to obtain.

Excavation, earth	20,972 c yds 12 cts,	\$2,516 64
do. rock	2,216 do. 60 cts,	1,329 60
Embankment	36,466 do. 30 cts,	10,939 80

Wall	12,293	do. 75 cts,	9,219 75
Grubbing,			140

\$24,145 79

Mile 33. Continues round the base of the last mentioned hill. Stones for walling and a portion of the embankment may be obtained from the hill.

Excavation, rock	2,246 c yds at 60 cts,	\$1347 60
Embankment,	98,745 do 40 cts,	39,498
Wall,	13,920 do 75 cts,	10,440
Grubbing,		220

\$51,505 60

Mile 34. Passes 23 chains in the river, and the remainder along the bottom land, where there will be easy excavation of an extra depth, which will furnish stuff for embankment. One bridge will be required.

Embankment,	2,6740 c yds at 20 cts,	\$5,348
Excavation of earth	44,354 do. 13 cts,	5,766 02
do. rock	1,429 do. 60 cts,	857 40
Wall,	4,720 do. 75 cts,	3,540
Bridge,		280

\$15,791 42

Mile 35. Passes over good ground for a canal. Two culverts and three bridges required.

Excavation,	18,249 c yds at 10 cts,	\$1,824 90
Embankment,	3,126 do 15 cts,	468 90
Culverts,		813
Bridges		840

\$3,946 80

Mile 36. Good ground for a canal. One culvert and two bridges will be required.

Excavation	23,126 c yds at 10 cts,	\$2,312 60
Embankment	2,460 do. 14 cts,	344 40
Culvert,		312
Bridges,		550

\$3,529

Mile 37½. Passes over sideling ground. A medium depth of excavation may be obtained in most places. Two bridges necessary.

Excavation	41,340 c yds 10 cts,	\$4,134
Embankment	3,691 do. 14 cts,	516 74
Bridges		560

\$5,210 74

RECAPITULATION.

Amount of excavation, embankment, &c.	\$344,538 36
9 locks of wood and rough stone, at \$,800,	16,200
One guard lock of do. at \$1,500,	1,500
Dam at Shamokin ripples,	37,984
Wasteweirs,	4,000
30 miles of fence, \$480,	14,400
Embankment of locks and bridges,	7,305 50
Excavation of foundations for locks, aqueducts, culverts, &c.	3,434 73
	<hr/>
	\$429,362 59
Add 10 per cent. for contingencies,	42,906 25
	<hr/>
	\$472,298 84

If stone locks should be adopted, the total expense of constructing the above $37\frac{1}{2}$ miles of canal with 62 feet of lockage, would be \$524,298 84.

If the line of canal is extended to the mouth of the Juniata river and terminated on a level corresponding with that on the eastern bank, there must be added to this amount the cost of constructing $24\frac{41}{100}$ feet of lockage, and about $1\frac{3}{4}$ miles of canal.

All which is respectfully submitted,

Signed

SIMEON GUILFORD.

Engineer.

June 28, 1827.

No. 4.

Liverpool, November 23, 1827.

Charles Mowry, Esq. Acting Commissioner upon the Susquehanna division of the Pennsylvania Canal.

SIR,

In obedience to your request, I have the honor to submit the following statement of the total cost of the Susquehanna division of the Pennsylvania canal, from the west branch of the Susquehanna river, to a point near the head of Duncan's Island, viz.

Total cost of excavation of earth in canal,	\$80,985 10
do do rock,	20,764 51
do do slate	2,448 47
do do hardpan	3,516 80
do embankment,	53,518 92
do puddling,	19,776 32
do outer slope wall	25,029 42
do inner do do	7,583 55
do vertical do	11,263 15
do grubbing do	7,544 75
do waste weirs	4,200
do fencing	9,072 -

Total cost of channel in river	2,090
do road	20,596
do 2 miles towing path and mound	24,594
9 locks and one guard lock inclusive of all expenses	59,517
58 bridges inclusive of embankments	24,599 60
39 culverts	10,168
2 aqueducts	10,022 71
1 dam across Susquehanna river inclusive of raft-gap, } Iron work and filling in above the dam }	25,450
1 dam across Penn's creek	2,080
feeder and step gates at Shamokin ripples	2,200
1 do do at Berry's falls	14,416

\$441,350 76

In making the above statement, the several items of the amounts have been calculated at the contract prices, with a few exceptions of work not under contract, to which fair prices have been affixed and calculations made accordingly. In calculating the amount of rock, slate and hardpan, a comparative estimate for part of the amounts has been made from the quantities of those several items found in the progress of the work.

Respectfully submitted by,

Sir, your most obt. servant.

SIMEON GUILFORD,

Engineer.

Series 6.

No. 1.

First report of De Witt Clinton, jr. on the Juniata location.

To the honorable Board of Canal Commissioners of Pennsylvania.
GENTLEMEN,

I have the honor to report, in part, my opinion of the relative advantages of the sides of the Juniata river for the construction of a canal, from Lewistown to the Susquehanna river. In submitting my views on this subject, I remark, that I have predicated them on a careful examination of the economy of the work, and the benefits which will result to the citizens, from the location of the line.

I therefore recommend, that the canal should commence at the mouth of the Kishocoquillis creek, at Lewistown, and continue on the north side of the river to North's Island. At this point to cross, by a dam, to the south side of the river, and end for the present at or near the head of Duncan's Lower Island, until new examinations can be made to establish the most eligible point to terminate the canal on the Susquehanna river.

Respectfully submitted,

DE WITT CLINTON, Jun. *Engineer.*

Harrisburg, July 1, 1827.

No. 2.

First report of Mr. Guilford on the Juniata location.

To the Board of Canal Commissioners of Pennsylvania.

GENTLEMEN,

In compliance with the resolutions of the board, directing Mr. Clinton and myself to "make further examinations on each side of the Juniata, between the mouth of that river and Lewistown, in order to ascertain which side of the river is most favorable and most proper to be adopted for the construction of a canal," I have the honor to report.—That, from an examination of the north and south sides of the Juniata river, from Duncan's Lower Island to North's Island, near Millerstown, I concur with Mr. Clinton in the opinion that the south bank of the Juniata, from Duncan's to North's Island, is the most proper to be adopted for the location of the canal.

I have not had time, since the resolution of the board, to finish the surveys on the Susquehanna and make further examinations on the Juniata river; but, from the descriptions given by Mr. Clinton, Mr. White, and respectable people who are acquainted with the topography of the country, in the vicinity of the Juniata, above Millerstown, I believe the north side of the Juniata is the most suitable for the construction of the canal, above that place.

Respectfully submitted,

SIMEON GUILFORD, *Engineer.*

July 1, 1827.

No. 5.

*Joint report of Messrs. Guilford and Clinton on the Juniata location.**To the honorable Board Pennsylvania Canal Commissioners.*

GENTLEMEN,

On the first of last month we had the honor of submitting our views on the location of a canal, from Lewistown to the head of Duncan's Island. We have since, in compliance with our instructions, completed the necessary examinations below that point, and the surveys and soundings of the several proposed places of crossing the Susquehanna with a canal. We have now the honor to mention the result, with a comparative estimate of the cost of the several places.

The first consideration is the crossing of the Susquehanna with a dam. This latter work is necessary on the present location of the eastern division of the canal, and a dam is commenced for this purpose on Foster's upper rift.

The places that have been proposed to cross the Susquehanna, is at Duncan's Lower Island and Clark's Lower Ferry. The dam constructing on Foster's Rift will not raise the water sufficiently high to allow boats to cross in low water at Duncan's Island. We consider the construction of a channel at that point impracticable. It would therefore be necessary, in crossing on a low level at this point, to construct a dam three feet high, the top of which to be only eighteen feet below the level established for the aqueduct.

On a review of our several estimates, and a careful comparison, we are satisfied that the crossing of the canal, either on a high or low level, at Duncan's Lower Island, would be the most proper place. We would also remark, that if an aqueduct is necessary, that it would be much more economical to construct it at this time than hereafter. If the lower level should be adopted for the present, it will occasion the expenditure of 58,819 dollars, on works which will be rendered entirely useless, should the aqueduct be found unnecessary hereafter, which in our opinion will be.

We beg leave to submit, for the consideration of the board, the following comparative estimates of the several plans:

Estimate of the cost of uniting the Juniata and Susquehanna canals, near the head of Duncan's Island, and constructing a canal upon a high level across the island, for the purpose of crossing the Susquehanna river by an aqueduct, or by a tow path connected with a turnpike bridge, above the mouth of the Juniata.

Aqueduct across the Juniata, near the head of Duncan's Island,	\$ 33,306
Canal, from the junction to the point of Duncan's Island,	15,395
Aqueduct over Susquehanna	120,741
3 locks of stone on eastern side of the Susquehanna	24,000
Canal from the aqueduct to the eastern division canal	0,595
Dam of stone across the Susquehanna at Foster's falls	16,650
	<hr/> \$ 240,687

If an aqueduct is not constructed, there must be deducted from the above for the cost of the aqueduct, three locks of stone, and the dam at Foster's falls, 161,391

	\$ 79,296
Add for the turnpike and tow path bridge	73,043
do. do. 3 locks of wood and rough stone	6,000
Dam above mouth Juniata across Susquehanna	9,157
	<hr/> \$ 167,496

Deduct from this sum the difference in cost of canal from the aqueduct to the eastern division on the low level 15,000

	<hr/> \$ 152,496
Estimate of the cost of uniting the Juniata and Susquehanna canals, on the south side of the Juniata river, for the purpose of crossing the Susquehanna river at Clark's lower ferry, by an aqueduct, or by a tow path, connected with a turnpike bridge.	
Juniata canal around Onion hill	\$57,092
Susquehanna canal on Duncan's Island,	8,844
Canal from junction to Clark's lower ferry	6,144
Aqueduct across Juniata river	30,582
do. do. Susquehanna river	151,776
Dam of stone at Foster's falls	16,650
Three locks of stone	24,000
	<hr/> \$ 295,088

If an aqueduct is not built, there must be deducted from the above, the cost of an aqueduct and stone locks \$ 175,776

	<hr/> \$119,312
Add for the turnpike and tow path bridge	85,485
do. do. Three locks of wood and rough stone	6,000
do. do. Turnpike, bridge and towing path across the Juniata	14,869
	<hr/>

\$ 225,666

Estimate of uniting the canals upon a low level, and crossing the Susquehanna river, by a tow path, connected with a turnpike bridge at Clark's ferry.

Tow path around Onion bottom hill, for the Juniata canal	8,739
Dam across the Juniata	7,880
Canal on Duncan's Island	7,393
do. on west side of the Susquehanna	4,477
Bridge and tow-path across the Susquehanna	85,485
do. do. do. Juniata	22,343
Dam at Foster's falls	16,650
Five locks of wood and rough stone	9,000
	<hr/> \$ 161,967

Estimate of the cost of uniting the Juniata and Susquehanna canals upon a low level, and crossing the Susquehanna river by a tow path connected with a turnpike bridge, above the mouth of the Juniata.

Tow-path around Onion hill for Juniata canal	8,739
Dam across the Juniata river	7,880
Tow-path bridge across do.	8,500
Canal on Duncan's Island	7,393
Turnpike and tow-path bridge across the Susquehanna	73,043
Canal from the bridge to eastern division of canal	15,595
Dam of stone across the Susquehanna	9,157
Five locks of wood and rough stone	9,000

\$ 139,307

RECAPITULATION.

Cost of uniting the canals on the north side of the Juniata, and crossing the Susquehanna by an aqueduct at Clark's upper ferry	\$ 240,887
Cost of uniting on the south side of Juniata, and crossing at Clark's lower ferry	295,088
Difference in favor of upper ferry	\$54,201
Cost of uniting the canals at the above places on a high level with tow-path bridges.	
At upper ferry	\$ 152,496
Lower ferry	225,666
Difference in favor of upper ferry	\$73,170
The cost of canals on the low level for the purpose of crossing the Susquehanna with a tow path bridge.	
At Clark's lower ferry	\$161,967
do. upper ferry	139,307
Difference in favor of upper ferry	\$22,660

REMARKS.

If the canal should cross the Susquehanna river at any point below Clark's lower ferry, it will increase the length of an aqueduct or bridge, more than eight hundred feet. Should they cross at Cove mountain, aqueducts will be necessary over the Little Juniata and Sherman's creeks.

In estimating the expense of constructing the aqueducts and bridges, calculations have been made for stone abutments and piers, with superstructures of wood. The piers of the aqueduct across the Susquehanna to be one hundred feet span, and the bottom of the superstructures twenty feet above the river, at low water. The piers of the bridges are calculated to be two hundred feet span, and the aqueduct across the Juniata 50 feet span; the width of the aqueduct eighteen feet in the clear.

In estimating the expense of uniting the Juniata and Susquehanna canals on a low level, with the eastern division of the Pennsylvania canal, on a level three feet higher than the canal is located at present, nothing has been added for the cost of a lock three feet, which would be necessary. As the expense of the lock, if located about a mile and a half below the falls, would be less than the expense of rock excavation which would be saved by such location, without increasing the walling and embankment, or any part of the line.

Respectfully submitted,

Signed

DE WITT CLINTON, jr.
SIMEON GUILFORD,

Engineers.

Harrisburg, August 2, 1827.

No. 4.

Communication from J. Miller, Esq. in behalf of citizens of Perry county.

To the board of Canal Commissioners of Pennsylvania.

GENTLEMEN:

At the solicitation of many of the people of the county of Perry, I am induced, though very reluctantly, again to draw your attention to the location of the canal at and about Clark's ferry. I do it with reluctance and with feelings of delicacy, because I know you have been much troubled on this subject heretofore. I however, trust that the great interest the people of Perry have in this matter, and the vast importance of the subject itself will be an apology. I will first beg leave to call your attention to the following exhibition of the estimates of the engineers:

Expense of uniting the canals on the N. E. side of the Juniata and crossing at Clark's ferry by aqueduct (estimate of engineer,)	\$295,088
Expense of uniting them on Duncan's Island and crossing from the point of that Island by aqueduct,	240,887
Balance,	<hr/> \$54,201

In the estimate of crossing at Clark's ferry, the Rock or Onion bottom hill section, is estimated,	\$57,092
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Messrs. Hopkins and Patterson, stipulate to make it and give security for their perform- ance, for	40,000
Balance,	<hr/> \$17,092

In the estimates, the breadth of the river at Clark's ferry is taken at 260 feet more than its real breadth, which at \$50 per foot, the estimate cost of the aqueduct would be,	\$13,000
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The cost of completing that part of the canal from the Onion bottom hill to Clark's ferry, is estimated at \$6,144

At the rate for which similar contracts have been taken, it would cost, 3,320

\$2,824

\$32,916

Balance,

\$21,285

Mr. Clark alledges he will sustain damages by the destruction of his property, if the canal passes on the N. E. side of the river at Clark's ferry, to amount of \$20,000, but say that will be excessive, I set them down at

\$10,000

In case the canal should pass down the S. W. side of the river and cross at Clark's ferry, and I am authorised to offer, on the part of Mr. Clarke, a bonus of \$6,000, to be paid either in money, or property, to be chosen by the commissioners at a fair valuation, (excepting only his improvements and that the taking of which would interfere with them.

\$16,000

Balance against crossing at Clark's ferry,

\$5,285

Estimates on the low levels.

At Clark's ferry,
Duncan's Island,

\$161 967

139 307

Balance in favor of the Island,

\$22,660

Deduct as follows—Difference between the estimate for the Onion bottom hill, and Messrs. Hopkins and Patterson's stipulation,

\$17,092

Clark's damages if the canal goes on the N. E. side,

10,000

The bonus if it comes on the S. W. side to Clarks ferry,

\$6,000

\$33,092

Balance in favor of coming to Clark's ferry,

10,432

Thus if the above calculations are founded on correct data, as I believe they are, by the low levels, the balance is decidedly in favor of Clark's ferry, and upon the aqueduct level the balance is but \$5,285 against it. A sum which will bear no comparison to the advantages which will result, not only to the people of Perry, but to the state generally by crossing at Clark's ferry.

But gentlemen, there is a difference of opinion between the engineers, both as to the place of crossing and in their estimates. It

would therefore be highly gratifying to those who are interested, if a competent umpire could be called in to give an opinion.

I will now take the liberty to suggest (that in case you do not cross the river by an aqueduct) the idea of erecting the dam in the Susquehanna as originally located, so as to slack the water up to the Island, and also to put a dam in the mouth of the Juniata and slack the water to the heads of the Onion bottom hill or rocks. If this plan should be found practicable without prejudice to the navigation, it will certainly be much cheaper than either of the others. It will also afford an outlet from Clark's ferry into the canal, and it will prevent the necessity of building an expensive and insurmountable wall around the end of Peter's mountain. In case the canal should be brought down on either of the levels to Clark's ferry, I am authorised by Mr. Clark to release all damages and to offer the bonus of \$6,000, in either way mentioned.

The foregoing remarks are submitted for your candid consideration.

It is the anxious desire of at least $\frac{5}{6}$ of the whole population of the county, that the canal should cross at Clark's ferry, or at all events that they should not be barred from any communication with it at that point.

I am gentlemen,
Very respectfully,
Yours,

J. MILLER.

Philadelphia, Sept. 10, 1827.

N. B. Any explanation of the foregoing statements that may be wanted, I am ready to give them personally.

Series 7.

No. 1.

JUNIATA CANAL OFFICE,

Millerstown, Nov. 24, 1827.

To the Board of Canal Commissioners,

GENTLEMEN—In obedience to a resolution of the board, directing “each acting commissioner and superintendant to make out a detailed report of the particular situation of the work under his charge, of the amount of moneys actually expended upon it; of the amount paid for damages, together with a list of the engineers and other persons employed upon the line. And in short every particular in relation to the subject which is likely to be demanded, or with which the board or the legislature should be acquainted,” the undersigned has the honor respectfully to report,

That from the twenty-fifth day of June last past, until the several days of canal lettings, shewn in table A, the engineer corps on this division of the Pennsylvania canal, were busily employed preparing the different portions into which it was divided, ready for contract. Notwithstanding a great degree of sickness among the party, yet their zeal and diligence has enabled them to keep pace with their duties, and the work along the line has advanced with a steady progress and continually increasing force since the ground was first broken. A scarcity of laborers was experienced through the months of September and October, which will account for less work being done than may have been expected. The quantity of work done and the amount of money expended will be seen by a reference to table B. Laborers have become plenty and as almost every section along the whole line is believed to be in the hands of excellent contractors, I anticipate a vigorous prosecution of the work as soon as winter shall have relaxed its severity.

In assigning the various jobs upon the canal, the superintendant was governed by the following principles. First—To secure the most faithful and competent contractors. Second—To choose among such contractors the lowest bidders. Third—Not to throw too much work into the hands of any one man or company of men. Fourth—To make it an indispensable condition, that every contractor should give his personal attendance to the contract during the progress of the work; and Fifth—That contracts shall not be transferred in whole, nor in part, directly nor indirectly, without the consent of the superintendant.

The last two conditions have been incorporated in the articles of agreement, and they have had the salutary effect of banishing from this line, that pernicious species of speculator who may be denominated *canal jobbers*, and has it is believed, thrown the work into the hands of men who will honestly complete their engagements at prices which are generally, as low as labor and capital can afford. Table C. will exhibit the contract prices for the excavation of ninety

the sections; and table D, the rates at which the stone and wood work was declared.

It is out of my power to give any information on the subject of damage. Owing probably to the enlightened liberality and public spirit of the citizens residing along the Juniata, very little damages has yet been claimed and none have been paid.

When the canal was first located some of the inhabitants up the river manifested an anxiety, lest two dams of seven feet high each, which it was found necessary to erect in the rivers to supply the canal with water, should injure the natural navigation. But the plan of having a lock in each of these dams, has it is believed fully satisfied all the reflecting and disinterested portion of the community.

It is not my intention to have fences built along the canal for its protection unless otherwise directed by the board, being deemed an unnecessary expenditure. But the just claims of individuals shall be satisfied by erecting fences wherever in the prosecution of the canal it is found necessary to make breaches in enclosures.

Table E, presents a condensed view of all the persons who are or have been engaged in the engineer corps with the time they have served and the sums which have been paid each of them for wages. And table F, gives a view of their present organization.

It is with reluctance I approach a duty imposed on the board of commissioners and through them, on the acting commissioners and superintendants, by the fourth section of the act of the sixteenth day of April, 1827, which requires a distinct statement of "amount at which each section of the canal or other work, so contracted for, had been estimated, naming the engineer who made the estimate, and plainly stating whether the contracts are below or above the estimates, and by what amount, and if practicable, also to state the cause or causes of such difference."

The duty enjoined by the above extract from the law, is to me peculiarly unpleasant, as it requires comparisons of estimates made by engineers who deservedly stand high in their profession, and yet who differ greatly in the amount required to make this division of the canal, as two differs from one. The estimates now before me to draw a comparison from, are those of Canvess White, Esq. made in January, 1827, and those of col. Dewitt Clinton, jr. of November, present.

As Mr White, in his report, does not state distinctly the cost of each of his feeders, I have divided the gross sum fixed by him for those works by the miles, and added this sum to the cost of each section, with the expense of lockage and per centage. A comparison of the *quantities* and of the *cost* of canal estimated by the two gentlemen, between several points, is given in table G. It may be proper here to state, that Mr. White's levels were generally laid lower than those of Mr Clinton, and so low as to expose his works within the reach of ordinary freshets in the river; but I am unable to account for the great deficiency of wall in his return of the cost of the line.

Mr. White's line is apparently experimental, his levels being commenced at the lowest part of the river, and it does not appear from his report, on the draft accompanying it, that he has pointed out the places or the manner of supplying the canal with water. This mode of surveying will probably account for the difference in quantities. In all experimental surveys, the data must necessarily be in a great measure hypothetical, which may very readily lead an engineer to incorrect conclusions. Hence we may account for the striking difference of quantities given by Mr. White. In comparing the two estimates, we find that the estimated cost of the canal, made by Mr. Clinton, nearly doubles that of Mr. White. But by a comparison of the quantities, we then find the reason for the difference in the two estimates.

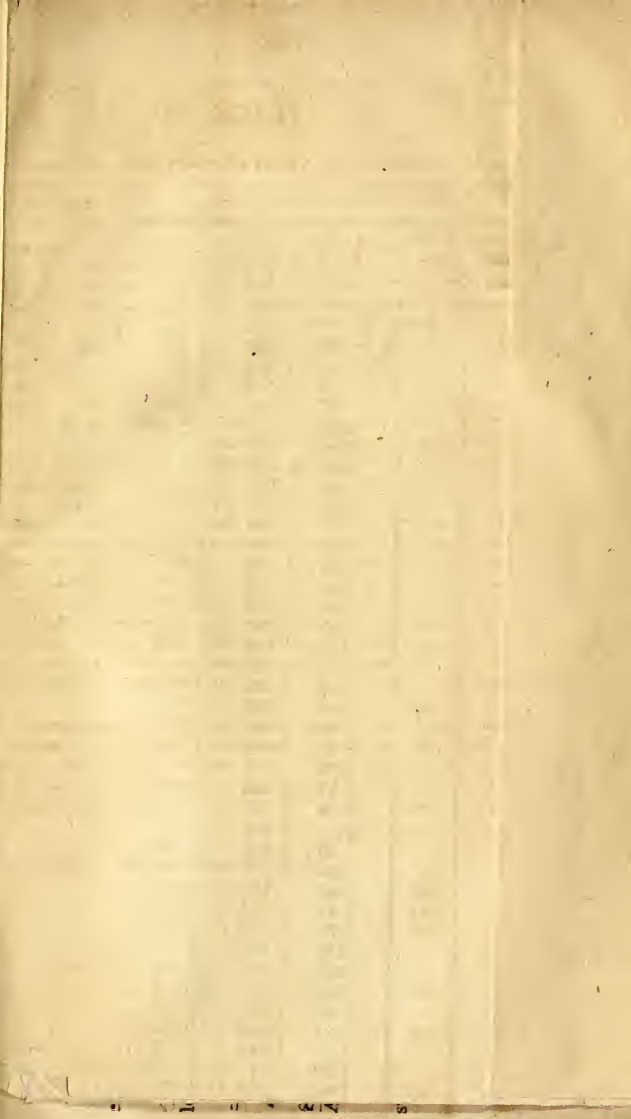
Without in the least wishing to lessen the high standing of Mr. White as a civic engineer, I feel myself warranted in saying, that I believe the estimate of Col. Clinton is predicated on good data, and generally on the contract prices, and that the work can be done within the estimate; and also that the present line of the canal is judiciously and economically located.

In comparing Mr. White's estimate on the north side of the river below North's island, with that of Col. Clinton's on the south side, as they stand returned by those gentlemen, the latter exceeds the former seventeen thousand dollars. But as Mr. Clinton's estimate on the upper part of the line is found to be about double that of Mr. White, and as it is but reasonable to apply the same rule to the lower part of the line, it follows that the board by the adoption of the south side of the river from North's island downwards, have saved to the state at least seventy thousand dollars, even should the canal be re-crossed to Duncan's island. But if it be connected with a slack water navigation in the river between Duncan's island and Onion bottom hill, the saving will be from eighty to eighty-five thousand dollars.

In conclusion I have to remark that so far as regards the progress of the work on this division of the canal, I trust it will be ready for the reception of boats early in the spring of 1829. And by that time I hope the land carriage between Philadelphia and Pittsburg will be reduced to about one hundred and twelve miles.

Respectfully submitted,

JAMES CLARK, *Superintendent.*



A statement of the quantity of work done, the amount of estimates for the same, and the sums of money paid thereon, on the Juniata Division of the Pennsylvania Canal.

No. of Section.	Names of Contractors.	Cubic Yards.						Perch, of 23 cubic feet..	Grubbing & clearing.			Amount paid.	
		Excavation.	Embankment.	Puddling.	Solid Rock.	Slate Rock.	Hard Pan.		Vertical Wall.	Outside slope wall.	Inside slope wall.	Amount of estimate for work done.	D. C.
1	Daniel Vanslyke,	843	42		86					540	314 600	908 81	727
2	Consaul, Yates & Magee,	2584			25						262 50	528 40	423
3	Beaumont & Co.										100	100	80
4	Do.	404			178				185		100	292 46	234
5	Do.	796										63 68	160
6	James Thompson,										200	200	236
7	Burr & Herkimer,										320	320	80
8	Paul Provost & Co.										100	100	80
9	Guy, Johnson & Co.										400	400	320
10	John H. Pool & Co.										400	400	320
11	Do.				398				425		400	752 54	601 46
12	Joseph M. Kasson & Co.						176				100	131 68	106
13	Thomas and James Moore,	2877			636		293				200	691 44	533
14	Do.	1642			477						100	422 16	338
15	Do.	432			531		631				300	733 30	603
16	Vanslyke & Devault,	1242			310		625	20			120	416 86	334
17	M'Manus & Cox,	537	614								30	286 23	229
18	Spink & Wellman,	4537			279			193			110	657 83	536
19	John and Charles Murray,										35	124	100
20	Michael Burk.	695	150								4	268 21	215 26
21	Henry & Erwin,	2176			63			75			20	455 66	379
22	Michael Holman & Co.	2517 1076			222		457				50	1640 96	1311 95
23	David Lask,	4227 175			135	25					42	614 33	491
24	Spink & Wellman,	2503 6050						407			15	1013 38	811
25	Spink & Lyles,	467			386	315 1058		309			75	916 01	732 59
26	Holman & Lyles,	1637			871 53	250		934			131	131	105
27	Michael Duivan,	9779			384	447		178			100	539 20	432
28	William Sternbergh,										100	724 891	580
29	Do.										12	466 72	280
30	Toner & Osborne,	2593			359		155				65	1275 93	1020
31	Anderson & Groves,	3684			114			336			81	20	65
32	High Speer,	6063									50	717 47	574
33	Samuel and Isaac Thompson,	1149 1024			896 227			976			90	348 69	279
34	Christopher Mark,	1160						40			150	287 70	469
35	Smith and Garmon,	3909 1745									15	284 08	298
36	Christopher Mark,	613 690			318						60	392 32	234
37	M'Namee & O'Friel,	4377									30	117 02	94
38	William Parsons,	3472									56	164 35	132
39	Guy, Johnson & Co.	2904									206	236 45	189
40	Guy, Noland & Smith,	916			45	611 355					45	474 55	380
41	Smith, Noland & Smith,										25	263 35	210
42	Dearmond, Rodearnel & Co.	6761									85	298 53	238
43	Knole & Wallace,	985									100	328 96	232
44	Milliken & Brothers,	435					72				20	274 72	230
45	Ross & Mathers,	5593			140						60	60	48
46	Atkin & Allen,	2478									87	905 42	725
47	David Brought	1115									100	590 09	232
48	Evans and Smith,	993 1150			2						15	370 26	297
49	Patrick Brown,	2149 237			23						80	1043 97	835
50	Casper Dull,	3069			40						25	329 24	484
51	Charles O'Donnell & Son,	1139 84									93	233 50	187
52	Schnabel, Stoughton & Co.										243	310 70	249
53	Pettit & Righter,	163			733			1080			180	180	144
54	Schnabel, Stoughton & Co.	2001									22 50	315 22	252
55	Stackpole & Stees,	3403 500			15						60	60	48
56	James Gallagher,	3025 2056			261						7	232 41	186
57	Armstrong & Anderson,	1833 2384 89									65	89 9	76
58	Guy, Johnson & Co.	1385			40						200	258 65	207
59	Schnabel, Stoughton & Co.	515									32	32	26
60	Do.										25	228 80	183
61	Sherman & Cummins,	3659									13	59 11	192
62	Atkin & Mathers,										67	259 80	192
63	E. Bosserman,	1598									35	421	336
64	Laird & Hunter,	151									168	184 80	148
65	Ira and Nelson Mericks,	2130			6			40			38	59 31	48
66	Guy, Johnson & Co.										200	200	
67	James and Daniel Johnson,	3710									100	100	
68	Wiley & Leagle,	240									25	128 80	103
69	Durmody & Egan,	275									241 25	241 25	193
70	Bernard O'Friel & Sons,										71	198 30	298
71	Dearmond, Rodearnel & Co.	1038									40	285 26	298
72	Quinn & McLaughlin,										45	366 47	293
73	B. & A. Elliott,												
74	M'Coy & Watts,	1340											
75	Byers, M'Coy & Co.	2803											
76	Thomas McQuoid,	3674											

(Signed,)

JAMES CLARKE, Superintendent.

Canal office, Millerstown, Dec. 19th, 1827.

225,262 56.

A Statement of Contracts for the Excavation of ninety-one Sections, on the Juniata Division of the Pennsylvania Canal.

No. of Section.	Names of Contractors.	Date of contract.	PER CUBIC YARD.						Per perch of 2 1/2 Perch cubic feet.		Grubbing and clearing.
			Excavation.	Embankment.	Puddling.	Solid rock.	Slate rock.	Hard pan.	Vertical wall.	Outside slope wall.	
1	Daniel Vanlyke	Sept. 12 1847	8 1/2	10	20	30	20	20	50	4 1/2	14
2	Consaul, Yates and Magee	Nov. 23	10	11	25	30	30	25	50	50	13
3	Do.	" 9	9	12 1/2	25	30	30	25	50	50	13
4	Beaumont & Co.	Nov. 9	8	13	18	55	24	20	45	55	12 1/2
5	Do.	Do.	8	14	18	35	20	20	50	58	100
6	James Thompson	Oct. 10	8	10	16	37	20	17	50	50	150
7	Burr and Herkimer	Aug. 9	12	10	27	45	25	30	45	40	135
8	Paul Provost & Co.	Oct. 10	10	14 1/2	17	49	24	25	47	47	13
9	Guy, Johnson & Co.	Nov. 17	12	14	30	45	25	17	50	60	121
10	John H. Pool & Co.	Sept. 12	9	13	30	48	20	20	58	50	400
11	Do.	Do.	9	13	30	48	20	20	58	50	400
12	Joseph M. Kasson & Co.	Oct. 10	13	14	18	38	25	18	40	40	200
13	Do.	Do.	11	13	18	38	25	18	40	40	130
14	Thomas and James Moore	Sept. 0	8	14	11	40	20	16	40	3 1/2	40
15	Do.	Sept. 4	8	14	11	40	20	16	40	40	400
16	Van-lyke and Devault	12	17	17	18	40	30	40	42	42	600
17	McManus and Cox	15	8	13	23	27 1/2	25	13	57 1/2	35 1/2	14
18	Spink and Wellman	Oct. 1	9	15	23	40	25	14	40	60	12 1/2
19	John and Charles Murray	Sept. 10	9	14	15	50	25	14	45	45	110
20	Cummings and Scott	Nov. 13	11	14	16	46	25	19	45	45	75
21	Michael Burk	Oct. 10	9	12 1/2	20	49	25	18	40	50	50
22	Henry and Erwin	Sept. 12	7	11 1/2	25	40	25	18	49	50	14
23	Michael Holman	Oct. 10	8	20	16	50	25	16 1/2	50	50	121
24	David Lask	Oct. 1	8	17	20	50	35	23	80	8 1/2	50
25	Spink and Wellman	Sept. 12	7	11 1/2	37	25	14	49	55	14	65
26	Holman and Lyles	Oct. 15	8	14	12 1/2	45	25	18	45	38	75
27	Michael Dunaway	Sept. 1	9	13 1/2	18	45	25	18	45	38	75
28	Wm. Steenburg	Sept. 4	10	14	18 1/2	45	18	18	63 1/2	75	130
29	Do.	Oct. 10	10	14	16	4	25	15	50	50	130
30	Toner and Osborne	Nov. 25	10	15	15	4	25	15	50	50	130
31	Anderson and Groves	Sept. 15	7 1/2	10	13	50	20	14	45	55	14
32	Hugh Speer	Sept. 25	do	14	10	30	20	10	47	50	12
33	Isaac and Samuel Thompson	Oct. 10	7	10 1/2	16	45	20	15	40	45	13
34	Christopher Marks	Sept. 3	7 1/2	13	25	35	25	18	40	48 1/2	11
35	Smith and Gannon	Oct. 10	10	13	25	35	25	18	40	48 1/2	11
36	Christopher Marks	Nov. 25	10	13	15	35	25	18	40	48 1/2	11
37	McNamee and O'Farrell	Oct. 10	7 1/2	14	17	45	25	20	50	50	12 1/2
38	Seaberg and Gerhard	Nov. 25	8	13	14	37 1/2	15	16	45	45	15
39	William Parsons	Oct. 10	7 1/2	13	14	37 1/2	15	16	45	45	15
40	Guy, Johnson & Co.	Nov. 17	8	13 1/2	15 1/2	34	18	15	40	40	60
41	J. M. and R. Allen	Sept. 12	8	do	15	45	19	12 1/2	50	50	150
42	Heard, Roderick & Co.	Nov. 5	11	14	20	49	24	18	40	50	13
43	Knot and Wallace	Sept. 12	7	10	25	43	30	25	50	50	13 1/2
44	Stackpole and Stees	Oct. 10	7	10	25	43	30	25	50	50	13 1/2
45	William Sterb-ig	Sept. 1	8 1/2	10	25	43	30	25	50	50	13 1/2
46	William and Brothers	Oct. 10	7 1/2	12	20	3 1/2	25	16	20	40	46
47	Atken and Mathers	Nov. 12	7	12	20	3 1/2	25	16	20	40	46
48	Ross and Allen	Nov. 17	9	15	14	31 1/2	25	14	55	60	40
49	David Brought	Nov. 25	8 1/2	15	14	31 1/2	25	14	55	60	40
50	Guy, Johnson & Co.	Sept. 10	9	18	20	40	25	20	50	50	130
51	Consaul, Yates and Magee	Nov. 9	7 1/2	12	12 1/2	45	25	16	40	40	130
52	Evans and Smith	Nov. 20	9	15	14	31 1/2	25	14	55	60	40
53	Patrick Brown	Oct. 10	7 1/2	12	12 1/2	45	25	16	40	40	130
54	Beaumont & Co.	Nov. 9	8	11	17	50	23	16	40	50	200
55	Casper Bull	Oct. 10	9	14	17	50	23	16	40	50	200
56	Charles O'Donnell and Son	Nov. 25	9 1/2	13	16	48	25	16	40	50	200
57	Schubel, Stoughton & Co.	Oct. 10	9 1/2	13	16	48	25	16	40	50	200
58	Pettit and Righter	Oct. 10	9 1/2	13	16	48	25	16	40	50	200
59	Schubel, Stoughton & Co.	Oct. 10	9 1/2	13	16	48	25	16	40	50	200
60	Stackpole and Stees	Oct. 10	9 1/2	13	16	48	25	16	40	50	200
61	James Gallagher	Nov. 17	10	15	15	43	25	16	40	50	200
62	Armstrong and Anderson	Oct. 10	8	14	16	44	24	18	40	49	12 1/2
63	Guy Johnson & Co.	Nov. 17	10	15	15	43	25	16	40	50	200
64	Schubel, Stoughton & Co.	Oct. 10	9 1/2	13	16	48	25	16	40	50	200
65	Do.	Do.	9 1/2	13	16	48	25	16	40	50	200
66	Brandt and Cox	Nov. 25	10	14	17	45	28	18	40	45	200
67	Shuman and Cummins	Nov. 25	10	14	17	45	28	18	40	45	200
68	Albin and Mathers	Nov. 5	8 1/2	10	16	40	25	18	40	45	200
69	Milliken and Brothers	Oct. 12	10	15 1/2	17 1/2	50	30	16	40	50	13 1/2
70	E. Boserman	Oct. 12	10	14	14	50	30	16	40	50	13 1/2
71	Ira and Hunter	Nov. 12	9	12	17	49	23	18	40	62 1/2	25
72	Guy, Johnson & Co.	Oct. 12	10	14	14	49	23	18	40	50	13 1/2
73	James and Daniel Johnson	Oct. 12	10	14	14	49	23	18	40	50	13 1/2
74	Wiley and Lealpe	Oct. 12	10	14	14	49	23	18	40	50	13 1/2
75	Darnoldy and Egan	Oct. 12	10	14	14	49	23	18	40	50	13 1/2
76	Bernard O'Farrell and Sons	Sept. 15	8 1/2	13	15	49	20	18	40	37 1/2	130
77	Deamond, Roderick & Co.	Nov. 21	10	13 1/2	14	49	23	18	40	37 1/2	130
78	Quinn and M. Laughlin	Oct. 12	10	14	14	43 1/2	25	16	40	45	130
79	B. and A. Elliott	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
80	McJoy and Watts	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
81	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
82	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
83	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
84	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
85	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
86	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
87	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
88	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
89	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
90	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
91	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
92	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
93	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
94	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
95	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
96	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
97	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
98	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
99	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130
100	Do.	Nov. 23	10	14	14	43 1/2	25	16	40	45	130

These sections marked thus (*) have a conditional clause, providing that the expense of bringing stone from a distance for the wall shall be at the estimate of the Engineer.

(Signed.)

Canal Office, Millertown, Nov. 24, 1837.

JAMES CLARKE, Superintendent.

Grubbing and
clearing.

Roll's:

600

3 0

150

200

50

200

50

25

25

25

10

50

24

50

10

10

10

10

5

5

5

Exhibiting the average prices at which the various kind of works were taken, at the several lettings on the Juniata division of the Pennsylvania canal.

Date of the lettings	No. of sec- tions let.	No. of propo- sals for the work.	Average rate at which the work was given out.						Grub- bing & clear- ing.			
			Per cubic yard.									
			Excava- tion.	Embank- ment.	Puddling	Solid rock.	Slate rock.	Hard-pan		Per perch of 5 cubic feet.		
			Cents.	Cents.	Cents.	Cents.	Cents.	Vertical wall.	Outside slope wall	Inside slope wall	Cents. per sq. yd.	
Aug. 15th	35	724	9	13½	18½	42½	24½	19	39	49	13	170
29th	28	652	8½	12½	16½	42½	22½	17½	42½	45½	12½	76
Sept. 12th	28	562	8½	13	15½	43½	23½	17½	45	50½	12½	160
Average of 91 sections,			8½	13	16½	42½	23½	18	42½	48½	12½	135½

Upwards of seven hundred proposals were received between the tenth and thirteenth of October last, for doing the stone and wood work along this line of canal—Which work has been allotted to competent bidders at reasonable prices.

JAMES CLARK, Superintendent.

Canal office, Millerstown, Nov. 24, 1827.

D. (Continued.)

Kind of work	No.	Names of contractors.	Per foot lift	Stone per perch	Gates, miter sills & iron works, gross sum	Foundation gross sum
Locks.	0	Jonathan Leslie	\$ 436			
	1	James S. Espy & co.	275			
	2	Jonathan Leslie		\$ 3 49	\$ 450	\$ 400
	3	Guy, Johnston & co.	370			
	4	Spink & Wellman	385			
	5	Dearmond, Rodearmel & co.	500			
	7	do do	325			
	8	do do	318			
	9	James S. Espy & co.	330			
	10	do do	330			
	11	do do	400			
	12	Dearmond, Rodearmel & co.	299			
	Guard at North's island	Schnable, Stoughton & co.		1 93	\$1783 wood work.	
.....						
Waste weirs	On sections	Names of contractors.	Per foot length thereof	Abutments per perch		
	3, 25, 35 and 44, 17	James S. Espy & co.	\$ 4 49		Average.	
	23, 53 and 63	Guy, Johnston & co.	3	\$ 1	Average.	
	71	Shuman & Lambert	5 28			
	76 and 85	M'Namee & Lambert Wright, Provost & co.	5 25 5 62		Each.	

D. (Continued.)

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On sections.	Contractors names.	Stone work per perch.	Woodwork gross sum.
3, 18, 19, 21, 23, 24, 28 & 29 25, 30, 73 75 & 88 35 & 41 44, 46, 47, 53, 56, 84, 85 & 87, 59 & 62 64, 69, 79, 80 & 81, 89 & 90,	Springer, Wells & co. Spink and Willman James S. Espy & co. Guy Johnson, & co. Stackpole and Stees, Leonard and Milliken, Aitkin and Mathews, Patrick Brown, Emmor Kimber, Pettit and Righter, Schnabel Stoughton & co. E. Bosserman Johnston and Groves, Byers, M'Coy & co. Sternbergh, Criswell & co. Stackpole and Stees, Brought and Dunbar, Mears and Vanslyke, Byers and M'Quoid, Sternbergh, Criswell & co. Brant & Cox, R. Mitchell, Bishop and M'Coy, Nov. 24, 1897,	2 32 2 75 2 29 3 2 50 2 75 2 65 2 33 2 16 2 25 2 50 2 87 3 25 2 40 98 86 68 1 22 99 Gross sum. 127 dollars each. 95 each. 95 each. 95 each.	831 average. 50 per ft: 2 average. 80 each. 50 115 52 average. 60 25 60 average. each. Superstruc. per ft. run 3 dollars aver. 1 90 average. 3 30 average. 1 0 average. 1 45

JAMES CLARK,
Superintendent.

Culverts,

Farm bridges. Pub. Bridges.

Canal Office, Millerstown,

E.

A list of persons who are and have been engaged in the engineer corps, their term of service and amount of wages on the Juniata division of the Pennsylvania canal.

Names of parties.	Office.	Comencing 1827.	Ending 1827.	Number of days service.	Per day.	Amount dollars and cents.
Dewitt Clinton, jr.	Engineer	June .. 2	Nov. 14, \$ 2000	Per annum.	
William H. Morell,	Principal asst. eng.	13	do	163	2	326
Joseph Nilson,	Rodman	do	Aug. 31	73	1 50	117
John C. Stocker,	do	do	July 29	45	1 50	67 50
Charles E. Miller,	do	do	4	20	1 50	30
George S. Armstrong,	Chain carrier	21	do	14	1	14
Thomas Wallace,	Baggage wagon	23	16	24	2 50	60
William B. Mitchell,	Surveyor	25	20	26	2	52
Henry Leas,	Axenian	do	Sept. 12	141	1	141
Thomas O'Brien,	do	do	Nov. 11	79	1	79
William Hunter,	do	do	Sept. 29	5	1	5
Isaac Gray,	do	30	June 15	16	1	16
Benjamin B. Reynolds,	Chain carrier	5	July 7	34	1	34
A. R. Hetzel,	Rodman	do	Aug. 13	71	1 50	106 50
George S. Armstrong,	do	do	Sept. 17	107	1 50	160 50
Philip Brady,	Baggage wagon	16	Nov. 18	21½	2 50	6 25
Adam Walters,	Chain carrier	do	July 19	3	1	3
Jacob Halbach,	do	do	do	3	1	3
Isaac Gray,	Rodman	do	Nov. 24	131	1 50	196 50

E. (Continued.)

Names of parties.	Office.	Commencing 1827.	Ending 1827.	Number of days service.	Per day.	Amount dollars and cents
John K. Findlay,	Asst. engineer.	July 17	Nov. 24	130	2	260
William North,	Axeman	July 17	24	130	1	130
Colder & Ramsey,	Baggage wagon	20	July 23	4	2 50	10
Thomas F. Purcell,	Assistant engineer	24	Nov. 24	124	2	248
Edward Watts,	Rodman	25	Oct. 11	79	1 50	118 50
Henry Miller,	Axeman	Aug. 7	Aug. 25	19	1	19
David Beidleman,	do	7	Sept. 8	33	1	33
Aquilla Burchfield,	do	25	Aug. 25	1	1	1
William Borgan,	do	25	Aug. 26	2	1	2
James R. Gilmore,	do	27	Sept. 11	16	1	16
Joseph Shuler,	do	30	Oct. 8	18	1	18
George Dull,	do	31	Sept. 23	24	1	24
Joseph Powers.	do	1	3	3	1	3
William Purcell,	do	1	Nov. 24	85	1	85
Joseph Nilson,	Assistant engineer	1	24	85	2	170
Abraham Addams,	Baggage wagon	6	Sept. 13	3 $\frac{1}{2}$	2 50	8 75
Robert Wilson,	Axeman	6	Nov. 11	62	1 50	62
Thomas O'Bryan	Rodman	11	24	74	1	111
Samuel Williams,	Axeman	12	Sept. 12	1	1	1
William Ross,	do	12	Nov. 24	74	1	74
Robert Mitchell,	do	13	Sept. 14	2	1	2

James Black,
 David M. English,
 Sterrite Fritz,
 Thomas Clark,
 Robert Wright,
 A. R. Hetzel,
 Joseph Miller,
 Robert Branyan,
 John Connor,
 Thomas Kinsloe,
 O'Bryan & Leas,
 James Dargon,
 Edward Watts.

Chain-carrier	19	14	2	1	2
do.	13	20	6	1	0
Axeman	17	20	4	1	4
Chain-carrier	17	20	4	1	4
Axeman	26	9	45	1	45
Assistant-engineer	26	24	60	2	120
Axeman	28	24	58	1	58
do.	29	3	5	1	5
do.	29	3	5	1	5
do.	Oct. 10	24	46	1	46
Baggage wagon	July to	Oct. 15	16½	2	50
Axeman	Nov. 5	Nov. 19	9	1	9
Rodman	21	24	4	1	50
			<hr/>		
			\$3,164 75		

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James Taggart, clerk in canal office June 22, November 24—150. 82—\$300.
Juniata Canal Office, Millerstown November 24, 1827.
 JAMES CLARK, Superintendent.

F

Shewing the present organization of the engineer corps, on the Juniata division of the Pennsylvania canal.

Engineer—Dewitt Clinton, jr.

Principal assistant engineers—William H. Morell, Thomas F. Purcell.

Assistant engineers—A. R. Hetzel, Joseph Nilson, John King Findlay.

Rodmen—Edward Watts, Thomas Obryen, Isaac Gray, David L. Scott.

Axemen—Joseph Miller, William Purcell, John Brown, William Ross, Jacob Leas, William North, James Strawbridge, Edmund Handlin.

The canal is about forty-four and a half miles long.

JAMES CLARK, *Superintendent*.

JAMES TAGGART, *Clerk*.

Juniata Canal Office,

Millerstown, Nov. 24, 1827.

G

A view of an estimate by Canvess White, Esq. compared with one made by Col. Dewitt Clinton, jr. of the probable quantities and cost of the Juniata division of the Pennsylvania canal.

Points of comparison.		Quantities.		Cost of canal.	
		White	Clinton.	White	Clinton
<i>From Lewis-town, to Miffian</i>					
Excavation	c. yard	272,340	303,807		
Embankment	do	215,125	204,937		
Puddling	do	54,880			
Rock	do	1,466	89,384		
Slate	do		13,829	112,629 96	245,382 27
Hardpan	do		10,119		
Vertical wall	perch		87,761		
Outside slope wall	do	20,713	87,507		
Inside do.	sqr.yd.		9,100		
<i>From Mifflin to Mexico.</i>					
Excavation	c. yard	117,252	108,019		
Embankment	do	24,580	119,455		
Puddling	do		8,311		
Rock	do	470	12,744	33,724 21	67,564 07
Slate	do		2,600		
Hard pan	do		2,980		
Outside slope wall	perch	1,741	34,602		

G (Continued.)

Points of comparison.	Quantities.		Cost of canal.	
	White	Clinton	White	Clinton
<i>From Mexico to Thompson-town.</i>				
Excavation	c. yard	167,301	179,098	
Embankment	do	44,442	39,244	
Puddling	do		9,775	
Rock	do		7,415	39,959 37
Slate	do		13,624	56,002 53
Hardpan	do		622	
Outside slope wall	perch	4,098	14,859	
Inside do. do.	sqr.yd.		9,347	
<i>From Thompson-town to North's Isl.</i>				
Excavation	c. yard	170,273	153,185	
Embankment	do	29,428	76,785	
Puddling	do		22,135	42,757 27
Rock	do	597	13,887	73,116 27
Slate	do		4,723	
Outside slope wall	perch	1,225	20,929	
Inside do. do.	sqr.yd.		1,574	
			\$220,070 81	\$442,065 14

From North's island downward, the canal having been located by Mr. White and Mr. Clinton, on different sides of the river, a regular comparison cannot be instituted. The sum of their estimates for that distance is given,

\$138,395 155,710 04

Whole cost as estimated by Mr. White, 367,465
 Whole sum " by Mr. Clinton, 597,775

Difference, \$230,310

No. 2.

To the Honorable board of Pennsylvania Canal Commissioners.

GENTLEMEN—I have the honor to submit the following report on the works, and estimate of the probable expense of constructing the Juniata canal from Lewistown to a point opposite the head of Duncan's lower island.

The location of the canal from Lewistown to the end of the long narrows, in the county of Mifflin, presents more than ordinary obstructions in its construction. The valley of the river is contracted between the ranges of the Black Log, Shade and Jack's mountain. The precipitous and rocky shores, on both sides of the river, render it impracticable to construct a canal on an elevated level, at a reasonable expense; as the works are continually forced into the stream to save surplus excavations from the mountain sides. It was indispensable, if we expected to combine stability and economy in the works, to locate the canal on a low level, and to raise banks elevated sufficiently to afford protection against floods. The canal banks through the narrows will be eighteen feet above low water, and over twenty five feet above the bottom of the river. I am inclined to an opinion from some examinations which I have made, that the greatest floods which have ever occurred, did not in most places, exceed the height of the banks in the narrows, but were several feet lower, and that the great rises which many people describe, proceed either from a desire of magnifying an evil, or to the ice accumulating in some narrow avenue. If the freshets should ever rise higher than the banks of the canal no injury can be reasonably apprehended. The works are not exposed seriously to ice freshets as the sides of the river on which the canal is located, are generally convex.

The canal from Lewistown to Burr's tavern (3 miles) is located eight feet above the river, at the mouth of the Kishacoquillas creek, and will be supplied from Jack's creek and the first mentioned stream; if the canal should end at its present location. If it is continued the latter stream will not be necessary: The dams located in the river are indispensably necessary to supply the canal with water. In constructing them the law on this subject will be strictly complied with, as river locks are planned in each dam. The river navigation will not be injured, but improved by them, as every man of intelligence must allow. I must also remark, that if the canal had been constructed on a low level at Lewistown, it would have increased the expense of the works from that place to the end of the Long narrows.

The dam at the toll-gate, was placed there on account of procuring materials more conveniently for its construction. To secure a better foundation, and to prevent interfering with the hydraulic power of the Kishacoquillas creek. A guard lock is not placed at this dam; but the water will be admitted into the canal through sluices. The access to the canal will be through the combined lift and guard lock at Lewistown.

The length of the canal from Lewistown to a point opposite to Duncan's island, is $44\frac{1}{2}$ miles. The length of the line on the south side of the river, as located is 14 miles. The level of the canal at a point opposite Duncan's island is $24\frac{41}{100}$ feet above low water mark at the commencement of the Onion Bottom hill. The fall of the river from North's island to the same point, is $39\frac{87}{100}$ feet, and from Lewistown to the island $74\frac{25}{100}$ feet.

The lockage as far as the canal is located is $95\frac{30}{100}$ feet, including a lock of 8 feet lift at Lewistown.

I have adopted for the constructions of the locks, wood and stone combined. The sides of the locks are to be made of upright posts, inserted into recesses, and secured to the walls with iron rods and screw nuts. The timbers are to be planked over with two courses, and each course is to be covered with a coat of pitch. Vacancies are left under the walls (which are to be constructed dry) for the water that may percolate through the sides, to flow into the lower level. The economy of this kind of locks is decisive in places where water, lime and stone of good quality can not be procured.

The average cost of the locks per foot lift will not exceed 396 dollars. The board will observe that in this mode of constructing locks the timbers will last a long time, and that the work can be easily repaired in that season when the navigation of the canal is stopped.

The Juniata river from its mouth to Lewistown, does not abound with stone of good quality. An agent was employed to explore the country, and after having carefully examined the quarries for several days, found but one suitable for the work, two miles above Mexico, on the south side of the river.

The greatest lift of any of the locks is 10 feet, and the least four feet. This last one is of cut stone, and will be combined with the aqueduct across Doe run at Mexico.

In locating the canal on the south side of the Juniata, an elevation sufficient could not be obtained to pass the waters of Big Buffalo creek, in times of flood. A stone arch in this case would have occupied too much room between the bed of the creek and the bottom of the canal. I have therefore substituted a cast iron bottom, composed of seven cast iron ribs of 18 feet span for each arch. The ribs will be covered over with rolled iron and plank. The parapets will be supported on stone arches, and lined on the canal side with brick work.

On the whole line of the canal there will be 23 public, and 25 farm bridges; eleven locks of combined wood and stone; two cut stone locks, one of them answering the purpose of a guard and lift lock, and one of rough stone and two river locks of 8 feet lift each. Eighteen culverts of four feet span—14 of 6 feet—7 of 8 feet, and one of 12 feet.

One cast iron aqueduct with 5 arches of 18 feet span, one of stone laid in water lime with three arches of 16 feet span each, two

with wood superstructures with 3 spaces of 30 feet each, and two with 2 spaces of 30 feet each.

The dam in the river at the narrows will be 405 feet long, and the other at North's Island 730 feet in length. The united length of the wasteweirs will be 2000 running feet.

The bottom of the canal will have half an inch descent in the mile, and conduits will be placed around each lock to keep the lower level full.

The cost of the canal is estimated at the present contracted prices, at \$245,382 $\frac{27}{100}$ from Lewistown to Mifflintown; and from Mifflintown to Mexico, at \$67,564 $\frac{27}{100}$, and from Mexico to Thompsonstown, \$56,002 $\frac{53}{100}$, and from Thompsonstown to North's Island \$73,116, $\frac{57}{100}$. The dam at North's Island, including the river and guard lock is \$15,066 $\frac{97}{100}$, and from North's Island to a point opposite the head of Duncan's lower Island \$140,642 $\frac{77}{100}$. The aggregate estimate of the whole line is \$597,775 $\frac{18}{100}$.

The cost of the dam, guard and river lock at North's Island is not to be included in the cost of the canal, on the south side of the river, as these works would have been necessary, and have no bearing on the choice of sides, as the canal would in either case have required two permanent dams in the river, from Lewistown to its mouth. The cost of the canal on the south side, embracing the extent of its present location, is only a few dollars over ten thousand dollars per mile.

In relation to the canal crossing on the south side of the river, it may be observed by some interested individuals, that feeders could have been taken from the tributary streams. If this plan had been adopted it would have inflicted serious injury on the surrounding country in destroying its hydraulic privileges, and the expense of constructing guard locks, feeders, and increasing the height of the dams, would far exceed the cost of the river improvement, and in the autumnal months, they would yield a precarious supply. If the canal had continued on the north side, the materials for its construction in many points would have to be taken from the opposite side of the river. The line would also have been of the most expensive character, on account of the precipitous and rocky bluffs on that side of the stream. The levels would also have been *so low*, that the works would have been within the reach of common freshets, and at points exposed to the whole violence of floods, and infringements of ice. It would also have precluded the practicability of a level sufficiently elevated to admit of the canal crossing the Susquehanna river in an aqueduct, if hereafter found necessary.

The dam at North's Island will also accommodate the citizens residing on the south side of the river, and those living in the valley of the Tuscarora creek. By this arrangement, it equalizes and extends the blessings of a great work.

The canal boats in crossing the river at North's Island, can either be accommodated with a tow path bridge or rope ferry. The latter will be the most economical, and the former the most beneficial to the country, as it can be connected on the same piers with a public bridge. The expense of the tow and public bridge if support-

ted on trussels will not exceed \$7000. If a rope ferry is adopted the power can be communicated from an overshot water wheel of 11 feet diameter, and propelled with water from the canal. The machine can be so geared that scows can pass simultaneously with the tow horses in opposite directions, without changing from rope to rope. The canal boats in crossing can be attached to the rope with cords and pullies. Its velocity can be regulated, that a boat can cross the river in the same time that it takes one to pass the locks. The expense of the whole apparatus would not exceed \$3000.

A rope ferry is constructed on the Erie canal at Schokarine creek. The power is, however, communicated from horses. This expense can be dispensed with, and the lock tender, can also superintend the ferry. I have to remark, as it respects the estimate, that I should have submitted tables of quantities, if it did not swell the report to an unreasonable size, if they are however necessary, they will be furnished. As respects the terms *excavation and embankment*, they include all the other works which are not particularly mentioned.

DE WITT CLINTON, JR.
Engineer.

Millerstown; Nov. 20, 1827.

Estimate of the canal from Lewistown to Duncan's lower Island.

SECTIONS.

Section, No.		Amount.	Aggregate
No. 1.	Amount of excavation, embankment, &c.	\$5,384 72	
	Bridge,	379 80	
	Locks, &c.	4,074 83	
		<hr/>	
		9,739 37	\$9739 37
No. 2.	Amount of excavation, embankment, &c.	7,226 00	
		<hr/>	
		7,226 00	16,965 37
No. 3.	Amount of excavation, embankment, &c.	3,043 08	
	Culverts,	415 92	
	Wasteweirs, and Jack's creek dam,	2,618 95	
		<hr/>	
		6,107 95	23,073 32
No. 4.	Amount of excavation, embankment, &c.	10,512 34	33,586 16
No. 5.	Amount of excavation, embankment, &c.	7,734 34	41,320 50
No. 6.	Amount of excavation, embankment, &c.	8,119 20	
	Bridge,	276	
		<hr/>	
		8,395 20	49,715 70

Section, No.		Amount.	Aggregate.
No. 7.	Amount of excavation, embankment, &c. Locks, Juniata dam at Burn's, and sluice,	15,030 70 10,406 37	
		<hr/>	25,437 07—75,152 77
No. 8.	Amount of excavation, embankment, &c.	10,879 50	—86,032 27
		<hr/>	25,437 07—75,152 17
No. 9.	Amount of excavation, embankment, &c.	12,703 11	—98,735 36
No. 10.	Amount of excavation, embankment, &c.	13,830 90	—112,566 28
No. 11.	Amount of excavation, embankment, &c.	13,595 18	—126,161 46
No. 12.	Amount of excavation, embankment, &c.	11,541 02	—137,702 48
No. 13.	Amount of excavation, embankment, &c.	9,434 25	—147,136 73
No. 14.	Amount of excavation, embankment, &c.	6,637 12	—153,773 85
No. 15.	Amount of excavation, embankment, &c.	7,508 61	—161,282 46
No. 16.	Amount of excavation, embankment, &c.	15,062 83	—176,345 29
No. 17.	Amount of excavation, embankment, &c. Lock and wasteweirs,	8,177 98 7,092 34	
		<hr/>	15,270 32—191,615 61
No. 18.	Amount of excavation, embankment &c. Culvert	4408 92 381 66	
		<hr/>	4790 58—196,406 19
No. 19.	Amount of excavation, embankment, &c. Bridge and culvert,	5321 56 710 96	
		<hr/>	6032 52 202,488 71
No. 20.	Amount of excavation, embankment &c. Bridges,	2789 70 355 50	
		<hr/>	3145 20—205,583 94
No. 21.	Amount of excavation, embankment &c. Bridge and culverts.	4189 40 1258 78	
		<hr/>	5448 18—211,032 09

Section.	Amount.	Aggregate.
No. 22. Amount of excavation, embankment, &c. Bridge,	2918 73 316 05	
	<hr/>	3234 78—214,266 87
No. 23. Amount of excavation, embankment, &c. Bridge, 2 culverts, Lock, wastewair, 2 last creek aqueducts,	3,681 13 522 36 6,721 94	
	<hr/>	10,925 43—225,192 30
No. 24. Amount of excavation, embankment, &c. Culvert,	3,922 62 395 36	
	<hr/>	4,317 98—229,510 28
No. 25. Amount of excavation, embankment, &c. Bridge, and culverts, Locks and wasteweirs,	8,562 12 663 37 6,646 50	
	<hr/>	15,871 99—245,382 27
No. 26. Amount of excavation, embankment, &c. Bridge,	9,269 79 463 50	
	<hr/>	9,733 29—255,115 56
No. 27. Amount of excavation, embankment, &c.	6,061 71	—261,194 62
No. 28. Amount of excavation, embankment, &c. Bridge and culvert,	5,447 94 631 12	
	<hr/>	6,079 06—267,273 68
No. 29. Amount of excavation, embankment, &c. Culvert,	8,137 91 1,350 70	
	<hr/>	9,488 61—276,762 29
No. 30. Amount of excavation, embankment, &c. Bridge and culvert,	5,145 43 631 22	
	<hr/>	5,286 65—282,048 94
No. 31. Amount of excavation, embankment, &c. Bridge,	8,146 08 127	
	<hr/>	8,273 08—290,322 02

Section.	Amount.	Aggregate.
No. 32. Amount of excavation, embankment, &c.	1,963 75	292,285 77
No. 33. Amount of excavation, embankment, &c.	7.005 75	299,291 52
No. 34. Amount of excavation, embankment, &c. Bridge,	1,634 59 312	
	<hr/> 1,946 59	301,238 11
No. 35. Amount of excavation, embankment, &c. Bridges and culvert, Do creek aqueduct, and lock, and wasteweirs,	1,861 63 2,165 10 7,681 50	
	<hr/> 11,708 23	312,946 34
No. 36. Amount of excavation, embankment, &c.	10,116 73	323,063 07
No. 37. Amount of excavation, embankment, &c. Bridge,	5,362 90 382 50	
	<hr/> 5,745 40	328,808 47
No. 38. Amount of excavation, embankment, &c. Bridge,	1,695 61 127	
	<hr/> 1,822 61	330,631 08
No. 39. Amount of excavation, embankment, &c. Bridge,	1,465 46 127	
	<hr/> 1,592 46	332 223 54
No. 40. Amount of excavation, embankment, &c. Bridge,	1,528 08 95	
	<hr/> 1,623 08	333,846 62
No. 41. Amount of excavation, embankment, &c. Bridges and culvert,	6,366 11 1,958 15	
	<hr/> 8,324 26	342,170 88
No. 42. Amount of excavation, embankment, &c. Bridge,	2,397 54 316 05	
	<hr/> 2,713 59	344,884 47
No. 43. Amount of excavation, embankment, &c.	3,630 27	348,514 74

Section.	Amount.	Aggregate.
No. 44. Amount of excavation, embankment, &c.	1,822 16	
Culvert,	497 62	
Lock and wasteweir,	3,110 95	
	<hr/>	
	5,430 73	—353,945 47
No. 45. Amount of excavation, embankment, &c.	1,559 60	
Bridge,	95	
	<hr/>	
	1,654 60	—355,600 07
No. 46. Amount of excavation, embankment, &c.	2,241 96	
Culvert,	1,518 60	
	<hr/>	
	3,760 56	—359,360 63
No. 47. Amount of excavation, embankment, &c.	1,990 08	
Bridge and culvert,	1,594 38	
	<hr/>	
	3,584 46	—362,945 09
No. 48. Amount of excavation, embankment, &c.	2,538 53	
Bridge,	127	
	<hr/>	
	2,665 53	—365,610 60
No. 49. Amount of excavation, embankment, &c.	3,052 25	
Bridge,	286	
	<hr/>	
	3,338 25	—368,948 87
No. 50. Amount of excavation, embankment, &c.	2,166 81	
Delaware run aqueduct,	2,789 57	
	<hr/>	
	4,936 38	—373,905 25
No. 51. Amount of excavation, embankment, &c.	3,837 07	
Bridge,	127	
	<hr/>	
	3,964 07	—377,869 32
No. 52. Amount of excavation, embankment, &c.	1,576 70	—379,446 02
No. 53. Amount of excavation, embankment, &c.	5,039 62	
Bridge and culvert,	521 56	
Lock and wasteweir,	3,614 20	
	<hr/>	
	9,175 38	—388,621 40

Sections.	Amount.	Aggregate.
No. 54. Amount of excavation, embankment, &c.	6,677 86	395,299 26
No. 55. Amount of excavation, embankment, &c.	1,227 62	396,526 88
No. 56. Amount of excavation, embankment, &c.	1,734 31	
Bridge and culverts,	573 62	
	<hr/>	
	2,307 93	398,834 81
No. 57. Amount of excavation, embankment, &c.	3,017 09	401,351 90
No. 58. Amount of excavation, embankment, &c.	8,824 33	410,676 23
No. 59. Amount of excavation, embankment,	3,598 87	
Culverts,	946 08	
	<hr/>	
	4,544 95	415,221 18
No. 60. Amount of excavation, embankment, &c.	2,046 68	
Bridges,	491	
	<hr/>	
	2,537 68	417,758 86
No. 61. Amount of excavation, embankment, &c.	4,457 50	422,216 36
No. 62. Amount of excavation, embankment, &c.	2,919 14	
Bridges,	479 50	
Coquelamas aqueduct,	3,397 80	
	<hr/>	
	6,794 44	429,010 80
No. 63. Amount of excavation, embankment,	3,983 28	
Culvert,	950 12	
Locks and wasteweirs,	8,121 24	
	<hr/>	
	13,054 64	442,065 44
No. 64. Amount of excavation, embankment &c.	12,411 07	
Culvert,	635 96	
Guard lock, and Juniata dam at North's Island,	15,066 97	
	<hr/>	
	28,114 00	470,179 44
No. 65. Amount of excavation, embankment, &c.	7,204 17	
Bridge,	95 00	
	<hr/>	
	7,299 17	477,478 61

Sections.	Amount.	Aggregate.
No. 66. Amount of excavation, embankment, &c.	5,010 23	482,488 84
No. 67. Amount of excavation, embankment, &c. Bridge,	1,577 60 95 00	
	<hr/> 1,672 60	484,161 44
No. 68. Amount of excavation, embankment, &c.	1,610 76	485,772 20
No. 69. Amount of excavation, embankment, &c. Culvert, Big Buffalo Aqueduct,	2,137 36 435 83 5,332 05	
	<hr/> 7,905 24	493,677 44
No. 70. Amount of excavation, embankment, &c, Bridge,	1,667 53 371 40	
	<hr/> 2,038 93	495,716 37
No. 71. Amount of excavation, embankment, &c. Little Buffalo aqueduct and waste weir,	1,835 56 3,429 70	
	<hr/> 5,265 26	500,981 63
No. 72. Amount of excavation, embankment, &c.	9,327 69	510,309 32
No. 73. Amount of excavation, embankment, &c. Culvert,	8,891 16 425,37	
	<hr/> 9,316 53	519,625 85
No. 74. Amount of excavation, embankment, &c. Bridge,	4,839 69 371 40	
	<hr/> 5,211 09	524,836 94
No. 75. Amount of excavation, embankment, &c. Culvert,	3,405 53 425 37	
	<hr/> 3,830 90	528,667 84
No. 76. Amount of excavation, embankment, &c. Bridge, Lock and waste weir,	2,861 48 371,40 4,412 16	
	<hr/> 7,645 04	536,312 88

Sections.	Amount,	Aggregate.
No. 77. Amount of excavation, embankment, &c.	2,054 74	538,367 62
No. 78. Amount of excavation, embankment, &c.	2,221 92	
Bridge,	371 40	
	<hr/>	
	2,593 32	540,960 94
No. 79. Amount of excavation embankment, &c.	4,001 44	
Culvert,	388 91	
	<hr/>	
	4,390 35	545,351 29
No. 80. Amount of excavation, embankment, &c.	5,989 18	
Culverts,	885 28	
	<hr/>	
	6,874 46	552,225 75
No. 81. Amount of excavation, embankment, &c.	3,604 84	
Culverts,	2,038 83	
	<hr/>	
	5,643 67	557, 869 42
No. 82. Amount of excavation, embankment, &c.	9,873 53	567,742 95
No. 83. Amount of excavation, embankment, &c.	4,301 21	572,044 16
No. 84. Amount of excavation, embankment, &c.	2,535 92	
Bridge and Culvert,	516 62	
	<hr/>	
	3,052 54	575,096 70
No. 85. Amount of excavation, embankment, &c.	1,683 11	
Bridge and culvert,	515 51	
Lock and waste weir,	3,928 56	
	<hr/>	
	6,127 18	581,223 88
No. 86. Amount of excavation, embankment, &c.	1,872 08	
Bridge,	75 00	
	<hr/>	
	1,947 08	583,170 96
No. 87. Amount of excavation, embankment, &c.	2,151 61	
Bridge and culverts,	3,165 31	
	<hr/>	
	5,317 92	588,488 88
No. 88. Amount of excavation, embankment, &c.	1,705 16	
Bridge and culverts,	586, 07	
	<hr/>	
	2,291 23	590,780 11

Sections.	Amount.	Aggregate.
No. 89. Amount of excavation, embankment &c.	2,471 24	
Culvert,	507 62	
	<hr/>	
	2,978 86	—593,758 97
No. 90. Amount of excavation, embankment, &c.	1,122 28	
Culvert,	392 41	
	<hr/>	
	1,514 69	—595,273 66
No. 91. Amount of excavation, embankment, &c.	2,108 32	
Bridges,	393 20	
	<hr/>	
	2,501 52	—597,775 18

Series 8.

No. 1.

Bristol November 5, 1827.

To the Canal Commissioners of Pennsylvania.

The Superintendant of the Delaware division of the Pennsylvania canal, respectfully submits the following report, viz.

That in pursuance of the directions of the board, by authority of the 6th and 7th sections of an act passed the 9th day of April last, entitled "An act to provide for the further extension of the Pennsylvania canal," a party was organised under the direction of Henry G. Sargent, Esq. engineer, for the purpose of making a survey and examination along the valley of the Delaware. See statement hereunto annexed, marked A. That survey and examination was commenced on the 9th of July last, and prosecuted with the utmost diligence till completed. A report and estimate thereon having been made and accepted, and the location of part of the line, to wit: Eighteen miles thereof beginning at Bristol and extending upwards, along the valley of the Delaware directed. A party was organised for that purpose and commenced their operations on the 13th of September last. See statement hereunto annexed, marked B.

Another party was then organised under the direction of Mr. Sargent, and on the 17th of September last, commenced an examination along the valley of the Delaware, from Carpenter's point to Easton. See statement hereunto annexed, marked C.

The superintendant further reports, that after having given 30 days notice in two newspapers printed in the city of Philadelphia, two in Easton and two in Doylestown, 35 sections of the 18 miles directed to be located as aforesaid, (the same having been divided into 36 sections of half a mile each) were put under contract on the 13th of October last. See statement hereunto annexed, marked D, exhibiting the names of the contractors and the prices at which each section is contracted for. Many of the contractors have already commenced work; the remainder are about to commence.

and it is confidently expected, that the excavation on the whole of the sections let, will be in a good state of forwardness this fall.

Statement marked E, exhibits the estimate for the said 18 miles, as made by Henry G. Sargent, Esq. the engineer on the line: annexed to which are some observations explanatory of any difference that may exist between the estimate and the contract prices.

All which is respectfully submitted,
THOMAS G. KENNEDY, Superintendent.

A.

The survey along the valley of the Delaware from Easton to Bristol, and continued thence to Philadelphia, was commenced on the 9th day of July, 1827, and run on account of accuracy and dispatch with two levels. The following party having been organised for that purpose, viz.

Henry G. Sargent, engineer—salary \$2,000 per annum.

T. G. Kennedy, assistant engineer and draftsman, \$60 per month

William Willer, } Assistant do \$60 per month,

James Sargent, }
 Thomas Stewart, jr. } Target bearers \$1 50 per day,
 James M'Keen, }
 Charles Carey, }

Daniel D. Rogers, }
 Michael S. Heany, } Chain carriers \$1 do.
 Charles Heckman. }

Ralph Harris axman, \$1 do.

Thomas Arnold do pro-tem, \$1 do.

Robert Ewill cook, \$1 do.

A wagon and one horse for the transportation of baggage, was sometimes employed; a boat was sometimes used, and occasionally other means resorted to as convenience or necessity directed, equivalent to the hire of a wagon and one horse and driver for the whole time at \$2 50 per day.

NOTE.—Other chain carriers and axemen were occasionally hired for a few days, while exploring the routes to Newtown, Oxford, Aspys, Tullytown, &c.

B.

The location of 18 miles of canal from Bristol upwards, was commenced on the 13th of September last, extending to near Taylor's ferry. The persons employed thereon, are as follows, viz.

Thomas G. Kennedy superintendant, \$3 per day.

Henry G. Sargent, engineer,

Emerson M'Ilvaine, } Assistant engineers, at \$60 per month.

Charles G. Schlatter, }
 Thomas Stewart, jr. } Target bearers, at \$1 50 per day.
 Michael S. Hoaney, }

David Kirgan, axeman, at \$1 per day.

Chain carriers and another axeman are occasionally employed when wanted for a short time, at \$1 per day.

C.

The survey from Carpenter's point to Easton, was commenced on the 17th of September last, & is now in progress; the party consist of Henry G. Sargent, Engineer.

William Willer, } Assistant do \$60 per month.
 James Sargent, }
 Charles Miller, Surveyor and draftsman, \$60 per month.
 Charles Heckman, } Target bearers, \$1 50 per day.
 Charles Carey, }
 William Nyce, } Employed as target bearers, during the sick-
 John Hornbock, } ness of Heckman and Cary, \$1 50 per day.
 William Cowell, } Chain carriers, \$1 00 per day.
 John Smith, }
 Ralph Harris, Axe man, \$1 00 per day.
 Stephen Docice, Cook, \$1 00 per day.
 Transportation of baggage, same as from Easton to Philadelphia.

NOTE. This party suffers much from sickness, which makes the occasional employment of supernumeraries indispensable, they are however, in no instance, retained longer than absolutely necessary.

D.

Contractors.	Sections of half a mile each.	Grubbing & clearing the whole section.	Per Cubic Yard.						Prch		Sqryd
			Excavation.	Embankment.	Puddling.	Solid rock.	Slate rock.	Hard pan.	Vertical wall.	Outer slope wall.	Inner slope wall.
John L. Bevens, Morris, Cook and co. Jedediah Beckwith, do do Daniel Thomas, John L. Bevens, Daniel Thomas, Morris, Cook and co. do do Daniel Thomas, Phineas Paxson, Kasson, Gray and co. Thomas and Jas. R. Scott. do do Benjamin R. Morgan, Benjamin R. Morgan, do do Morris, Cook and co.	no 1	25	7 $\frac{3}{4}$	9 $\frac{1}{2}$	25	50	35	25			25
	2	25	8	8		75	60	25			25
	3			12 $\frac{1}{2}$							
	4		8	12 $\frac{1}{2}$		75	60	25			
	5		8	12 $\frac{1}{2}$	25	75	60	25			
	6		7 $\frac{1}{2}$	12 $\frac{1}{2}$		50					
	7	25	7 $\frac{1}{2}$	11							
	8		7 $\frac{1}{2}$	12 $\frac{1}{2}$		50					
	9	15	7	7		50	35	25			
	10	15	7	7		50	35	25			
	11		7 $\frac{1}{2}$	12 $\frac{1}{2}$		50					
	12		7 $\frac{1}{2}$	12 $\frac{1}{2}$		50					
	13	10	9	16		50					
	14		7 $\frac{1}{2}$	12						15	
	15		7 $\frac{1}{2}$	12						15	
	16		7 $\frac{1}{2}$	12 $\frac{1}{2}$						15	
	17		7	12 $\frac{1}{2}$						15	
	18		7	12 $\frac{1}{2}$						15	
	19	2 50	12	12		50	35				25

D.—CONTINUED.

Contractors.	Sections of a mile each.	Grubbing & clearing the whole sec.	PER CUBIC YARD.						PERCH.		Remarks.
			Excava- tion.	Embank- ment.	Puddling	Solid rock.	Slate rock.	Hard pan.	Vertical wall.	Outer slope wall	
Kasson, Gray and co.	20	25	11	16	16	60	25				
Christopher Medler,	21		9½	11	25	60	25	16			
Morris, Cook and co.	22	50	9	9		50	35	25			
Christopher Medler,	23		9	11	25	60	25	16			
Blackstock and Moore,	24		7	12½	12	37½		18			
Morris, Cook and Co.	25	1 50	10	10		50	35	25			
Blackstock and Moore.	26	1 50	8½	12½	12	37½		18¾			
Morris, Cook and co.	27	25	9	9		50	35	25			
do	28		9	9		50	35	25			
do	29		8	8		50	35	25			
do	30	60	10	10		50	35	25			
do	31	2 00	10	10		50	35	25			
Barker Smith & M'Allister	32		8½	11		42	24	18¾			
do	33		8½	11		42	24	18¾			
do	34		8½	11		42	24	18¾			
Patrick Mulvaney,	35	1 55	8	14		45	18	18		40	25
do	36	1 55	8	14		45	18	18		40	25
Average Excavation,			8½½								
Average Embankment,			8½½	11½							

NOTE. Blanks in the foregoing statement, to be filled at the estimate of the Engineer.

E.

Per cubic yard.

Sections of 1 mile each beginning at Bristol.	Section as numbered on estimate.	Grubbing & clearing the whole sect.	Excavation	Embank- ment	Solid rock
	No.	dols.	cts.	cts.	cts.
1st mile section,	60		8	11	
2 do do	59		7		
3 do do	58		7		
4 do do	57		7		
5 do do	56		8		
6 do do	55		8	11	
7 do do	54		8		
8 do do	53		8		
9 do do	52	200	8		
10 do do	51		10		
11 do do	50		15		
12 do do	49		10		50 { bluff point at Mor- risville }
13 do do	48	300	12	12	
14 do do	47	200	11	11	
15 do do	46		8		
16 do do	45	200	8		
17 do do	44	350	9½		
18 do do	43		8		

From the foregoing statements, it will be seen, that the average price for common excavation according to the estimate is,

And according to the actual letting it is

For embankment, per estimate

do per contract

8½ cts. pr. c. yd.

8½ cts. do

11½ cts. do

11½ cts. do

And this average will in reality be reduced somewhat lower; because on some of the sections where the highest prices are proposed for embankment, there will be none, as on 13 and 20; and on others very little, as on 35 and 36.

The actual letting is therefore less than the estimate, for it will be recollected that Mr. Sargent's estimate, from which the foregoing is copied, was predicated on the supposition that the canal would be four feet deep; and to which estimate the sum of \$45,972,30 was afterwards added for a five feet cut; being about 16 cents per cubic yard for the excavation of the additional foot. This sum, should no unforeseen difficulties present themselves, it is fair to conclude, will be excess in the estimate.

No comparative view of the other items of the contract prices can be made with any approximation to accuracy, for although proposals were offered and received on many of the sections, as well

for rock, hard-pan &c. as for common excavation and embankment, yet it is not anticipated that much will occur on the 18 miles, except some solid and detached rock in the neighborhood of Morrisville, especially on the 19th, 20th and 21st sections, and some shell or slate rock on three or four of the upper sections. Nor can any comparison between the estimated and actual cost of locks, aqueducts, culverts or bridges be made, as none have yet been put under contract.

No. 2.

To the board of Canal Commissioners of Pennsylvania.

GENTLEMEN,

In compliance with instructions received from the secretary of the board at Philadelphia, on the 8th of July last, relative to a survey for a canal along the valley of the Delaware river. I proceeded immediately to Easton, and as soon as a sufficient party could be organised, the necessary surveys and examinations were commenced, keeping in view a continuation of the canal up the Delaware to Carpenter's point. My attention has been directed to an examination and estimate of the route south of the Lehigh. In commencing this survey, it was important to determine the most eligible mode of crossing the Lehigh, and of making use of that stream as a feeder.

To effect these two objects, I adopted the plan of raising the water in the Lehigh, ten feet, by a dam, of corresponding height and accordingly assumed a level ten feet above the surface of the water, at its junction with the Delaware, for the governance of my examinations. From this point a careful and particular estimate of each mile has been made, including fencing, bridges, aqueducts, culverts, rebuilding roads, &c. The aggregate expense of each mile so estimated, together with the amount for lockage, waste wiers, and the dam across the Lehigh, also comparative estimates of the Bristol and Tullytown routes, and the additional expense for a canal of five feet depth, will be seen by a reference to the schedule of estimates herunto annexed.

In constructing this canal the most important difficulty is in passing bluff, rocky hills, which in many places, form the shore of the river: making it necessary to raise embankments from the water's edge, which must be protected by a wall, varying in height from fifteen to twenty feet, according to the relative situation of the river banks. A large portion of the route passes over undulating bottom land, soil, generally sand, loam and gravel.

After passing New Hope about four miles, the country west of the river becomes more level, bottom land increases in width, and the general aspect would seem to give more latitude to the location of a canal. Under this impression various routes were suggested for the purpose of crossing the country to Neshamony, and actual surveys have been made on the most favourable that could be found: the result of these examinations, I think determines the impracticability of either of the routes suggested: consequently the

location of the canal must be confined immediately to the valley of the Delaware, as far as Morrisville. At this place a question arises as to the most favourable place of termination. To this effect, different routes have been examined, the most prominent of which are those designated in the schedule of estimates, by the names of the Bristol and Tullytown routes. A view of the relative situation of these routes may be seen by a reference to the map herewith presented.

This it is presumed, will be sufficient for the governance of the board in fixing on the place of termination.

The estimates hereto annexed are predicated on the supposition that the canal be 4 feet wide at the top, 8 at bottom, and 4 feet depth. Locks 90 feet clear in length, and 14 feet width.

The additional estimate for 5 feet depth, supposes the canal to be 40 feet wide at top, with proportionate width at bottom. Locks 100 feet clear in length and 14 feet width.

All which is respectfully submitted,

H. G. SARGENT, *Engineer.*

Bristol, August 20, 1827.

Estimate of the cost per mile of the canal along the valley of the Delaware, commencing on the south side of the Lehigh at Easton.

<i>No. of miles.</i>	<i>Cost per mile.</i>	<i>No. of miles.</i>	<i>Cost per mile.</i>
1	\$20,436 22	27	\$12,946 27
2	19,732 30	28	32,585 88
3	12,448	29	10,555 79
4	18,873 12	30	28,0 6 25
5	17,823 24	31	4,679 20
6	12,757 60	32	4,849 39
7	27,335 90	33	6,185 20
8	29,178	34	3,687 20
9	3,302 80	35	10,220 24
10	12,390 48	36	7,534
11	11,135 68	37	5,023
12	12,256 28	38	4,838 64
13	23,202	39	11,684 40
14	4,519 20	40	4,135 60
15	5,103 16	41	6,708
16	4,342 80	42	8,003
17	4,501 84	43	3,674
18	3,643 20	44	5,566
19	3,397 49	45	5,013 20
20	2,566 51	46	4,672 80
21	3,299 11	47	4,939 20
22	9,086 72	48	9,220 80
23	9,303 10	49	5,833
24	4,332 40	50	2,884 40
25	12,863 40	51	4,578
26	4,307 40	52	4,076 40

No. of miles.	Cost per mile.	No. of miles.	Cost per mile.
53	4,535 44	55	4,206 40
54	4,446 64	56	9,193 96

	\$520,740 5
Wasteweirs,	3,000
Dam across Lehigh,	6,000
Lockage 170 feet at \$200 per foot,	34,000

Add 10 per cent for contingencies,	\$59,740 25
	56,974 02

Total amount of the Tullytown route,	\$626,714 27
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Average per mile at 4 feet cutting,	11,191 32
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Estimate of the Tullytown route for a canal 5 feet deep.

To	\$626,714 27
Add,	43,184 46

Total amount,	\$669,898 73
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Average per mile,	11,962 47
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Estimate of the Bristol route, continuing from the end of section 51 on the Tullytown route.

	No. of miles.	Cost per mile.
Amount to and including	51	\$ 500,281 41
	52	4,476 40
	53	4,935 44
	54	4,846 64
	55	6,178
	56	4,618
	57	2,928
	58	3,058
	59	2,970
	60	5,094

539,385 89

Add for waste weirs, dam locks, as for the Tullytown route

43,000

582,385 89

Add 10 per cent. for contingencies, &c.

58,238 58

\$640,624 47

Average per mile at 4 feet cutting

10,677 07

Estimate of the Bristol route for a canal of 5 feet deep.

To	\$640,624 47
Add	45,972 30

Total amount	\$686,596 77
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Average per mile	11,443 27
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To the Board of Canal Commissioners of Pennsylvania,

GENTLEMEN,

In pursuance of instructions received from the secretary of the board, I have continued a survey and estimate for a canal along the valley of the Delaware river from Bristol to Philadelphia, terminating at Kensington, near Mr. Dyott's glass factory.

The level for this line was commenced at a benched willow tree opposite the borough of Bristol, corresponding with the anticipated location of the canal at that place, as previously surveyed, and extended along the north side of the turnpike to Neshamony creek. From thence crossing the turnpike the line passes between it and the river, to the place of termination.

The surface of the country generally, is considerably undulating, which would cause frequent extra-excavations and embankments. The soil is principally loam, sand and gravel, some cobble stone.

In making the estimate I have calculated the cubic yards of excavation and embankment at prices varying according to the nature or the work. The estimate for aqueducts over Poquiston, Pennypack and Frankfort creeks, supposes them to be built with stone abutments and piers, with wooden superstructures. The one over Neshamony is calculated to be built entirely of stone, whole length of water way, two hundred and sixty feet.

Fences and bridges and all other necessary appendages, have been included in each mile, the aggregate of which will be seen by reference to the schedule of estimates hereto annexed.

All of which is respectfully submitted.

H. G. SARGENT, *Engineer.*

Philadelphia, Sept. 10, 1827.

Estimated expense of a canal from Bristol to Philadelphia.

Section No.	1	\$ 4,498 40		
	2	4,952 80		
	3	50,322 00	Including aqueduct over Neshamony creek.	
	4	4,214 00		
	5	5,480		
	6	5,412 77		
	7	4,9 2		
	8	10,801 60	do.	Poquiston
	9	4,987 84		
	10	5,302		
	11	19,959 92	do.	Pennypack
	12	5,736 84		
	13	7,468 08		
	14	18,857 90	do.	Tecony or Frankford.
	15	4,506 40		

Section No. 16	4,336 40
17	4,417 60
17½ miles 18	7,944 64

Basin at Kensington.

	\$174,111 19
Add 10 per cent	17,411 11
do. 5 ft. canal	9,276 80

 \$201,799 10

 \$ 11474 23 $\frac{43}{100}$ Expense per mile for 5 feet canal.

No. 3.

Estimate of the cost of the eighteen miles of the Delaware Division now under contract, at contract prices.

The excavation and embankment the whole distance, including bridge embankments, rock and grubbing	\$71,922
For fences, bridges, aqueducts, culverts, &c. which have not yet been contracted for, the original estimate was	25,199

Whole cost of the 18 miles,	\$97,121
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H. G. SARGENT, *Engineer.*

December 15, 1827.

Series 9.

No. 1.

Application of members of the legislature for the appointment of William Wilson and John Mitchell, as surveyors.

Harrisburg, 16th April 1827.

SIR—The undersigned members of the senate and house of representatives of the state of Pennsylvania, representing portions of the state particularly interested in the question, whether a continuous water communication can be effected between the waters of the west branch of the Susquehanna and the waters of the Allegheny river, ask leave to submit through you to the board of canal commissioners, some suggestions in reference to the surveys and examinations directed to be made under the law of the present session of the legislature.

The inhabitants of a large portion of the country interested in the great question, whether or not water can be obtained for a continuous canal, are yet firmly of opinion, that an entire water communication can be effected.

They believe that to detail a principal engineer with parties to make explorations and primary examinations in a wilderness country, and to which he may be an entire stranger, would necessarily result in expenses that may be avoided, and also in unnecessary delay. They therefore take leave to suggest the propriety of detailing John Mitchell, of Centre county, and William Wilson, of Lycoming county, each to be supplied with a sufficient party to explore and examine all the routes of communication that may be deemed practicable.

That they shall be directed to continue separate examinations and surveys until they shall have made a selection of any route or routes that they may believe will effect a communication, and that upon communicating their decision, upon such examinations, to the canal commissioners, or to a superintendant who may be directed to accompany them, the board of canal commissioners may then order a principal engineer to meet Messrs. Mitchell and Wilson at the scene of their operations; and proceed to re-examine and level such route or routes as may be selected by him from the reports of the two assistant engineers.

In conclusion, they respectfully suggest, that upon an early adoption of the measures which may be thought proper to pursue in relation to this important service, may depend the success of the operations, and that no examination, in any part of the state, can

bear a comparison with this, in the important consequences that may result from it.

We are sir with great respect;
Your obedient servants;

Signed.

*H. Petrikin,
Robert Moore,
Greenwood Bell,
Stephen Woolverton,
John M^r Reynolds,
Constant Mathewson,
Robert M^r Clure,
D. Lawson.*

*John Ray,
W. Cox Ellis,
Thos. Atkinson,
H. B. Dorrance,
William Forster,
Philander Stephens,
Joseph Rankin,*

W. DARLINGTON, Esq. *President*
of the board of canal commissioners.

No. 2.

Instructions to Messrs. Wilson and Mitchell.

Philadelphia, May 15th, 1827.

Messrs. William Wilson and John Mitchell;

GENTLEMEN—In compliance with a written application to the canal commissioners, a copy of which is hereto annexed; you have been appointed to make further examinations in order to ascertain the practicability of a continued water communication between the Allegheny and Susquehanna rivers. It is the wish of the commissioners that this request may be gratified to the utmost possible extent, and that no means of determining so interesting a question may be left untried.

For the complete accomplishment of this object, examinations will be necessary on the east and Bennett's branches of Sinnemahoning, and along the whole dividing ridge, commencing at the head of the latter stream, and extending in a southerly and south-westerly direction to the heads of Blacklick, a branch of Conne-maugh. As this embraces a wide extent of country, abounding with difficulties, and where the progress of the surveyor must necessarily be retarded, it is desirable that some arrangement may be made between you which will ensure the utmost expedition and prevent interference one with the other. It is proposed therefore that you meet as early as possible, and divide the country to be examined equally between you. Having done this, you will each organise a party of the same strength as have heretofore been employed for similar purposes, and proceed to the active execution of the duty assigned you.

It would be difficult for the board, with their imperfect knowledge of the country, to define with precision the points to be examined, and they are disposed rather to leave you a general authority, to examine every point where the waters of the two great rivers approach each other, which you may suppose to afford a reasonable prospect of success, or which are thought to do so by the people of

that country. These examinations however, will be confined to the single object of ascertaining the possibility of a water communication across the dividing ridge, and the course of proceeding will be as follows:

Having ascertained the summit between any two waters which appears most favorable, you will proceed to ascertain the quantity of water on that level, by measurements, such as you have formerly made. If the quantity appears sufficient to warrant any further inquiry, you will then proceed to ascertain by actual survey, the practicability of introducing it upon the summit proposed, through a feeder—the length of such feeder; the facility with which it may be made; the quality of the soil through which it passes; and all other particulars which tend to elucidate the main subject of inquiry. It is left optional with you either to commence your line of levels at some known point already examined, and continue it without intermission through the rest of your examinations, or to assume new points more convenient, from which to begin your calculations. You will remember however that if any summit appears to you favorable for a water communication, it must be so connected with some point already known, as to enable you to ascertain its positive elevation above tide-water.

Wherever it is possible to obtain information from the inhabitants of the neighborhood, you will take care to do so, and you will omit no examinations or inquiry calculated to satisfy their minds, or test the accuracy of their opinions. It is wished also that general invitations may be extended to the most respectable and intelligent citizens, to be present at the surveys in which they feel an interest. You will keep accurate notes of all your proceedings, and as soon as possible, after your return, will report them in detail to the board, accompanied by proper drafts and maps of the country explored.

In the written application, of which a copy is furnished you, it is proposed that in the course of the season, a competent engineer may be sent to review the surveys and furnish his opinion as to the practicability of any routes which you may have fixed upon. With this proposition, the board will make every effort to comply. In order to enable them so to do, you are requested, at least once in two weeks, to apprise me of your situation and prospects, and of the point at which you may most conveniently be reached by letter or otherwise. Towards the latter end of August when the waters are lowest, is the time at which an engineer will probably be despatched. It is hoped that by that time you will have collected the necessary materials for a professional opinion.

Your obedient servant,

Signed,

JOSEPH M'ILVAINE

No. 3.

William Wilson's Report.

Jos. M'Ilvaine, Secretary of the Board of Canal Commissioners of Pennsylvania.

SIR—Your instructions of the sixth of June were received on the eleventh, and on the same day I proceeded with a party of hands, provisions, &c. to the portage summit of the Sinnemahoning and Allegheny river. We commenced our operations on the 18th and descended on the Sinnemahoning side of the ridge 103 feet in a distance of 177 perches. Returned to the summit and descended 102 feet on the Allegheny side in a distance of 179 perches. Having thus ascertained the form of the top of the ridge separating those streams, assumed a level 100 feet below its summit as the most suitable experimental elevation, and continued rounding the different streams and hills which intervened betwixt that and the mouth of the portage.

The reason which induced the adoption of this course was, that should any depression in the ridge, permit us to pass it, the distance to the Allegheny would be much shortened and we would then adapt our level of the feeder to such pass, either by elevating or depressing it; but no such opening presenting, we continued our level to the rounding near its mouth found the distance 21 and one-fourth miles and the depression to the surface of a mill pond at the confluence of the portage and Allegheny to be 334.58 feet. We then continued our level up the Allegheny to ascertain at what point its waters would be available upon the summit the distance by the valley was $22\frac{1}{4}$ miles (terminating about five miles above Couders port) to which may fairly be added 18 miles for the rounding of hills, streams, &c. presenting an aggregate of $61\frac{1}{2}$ miles, viz: $21\frac{1}{4}$ on the portage and $40\frac{1}{4}$ along the river. It was suggested, that a more practicable route might exist betwixt the heads of the first of the Sinnemahoning and Allegheny. This seemed plausible, as the heads of that stream make a nearer approach to the main river, than any other east of the mountain, being about $2\frac{1}{2}$ miles. We went to what was considered the lowest place in the ridge, descended 316.45 feet in a distance of 678 perches; three-fourths of a mile still remained to the river, and the stream we were descending falling rapidly, we were fully convinced, that the fall could not be less than 600 feet, therefore considered it totally impracticable, as no supply of water could be available at so high a level, or any reasonable depression which might be made, either by a deep cut or tunnel.

The succession of wet weather which preceded the completion of our survey upon the Allegheny, rendered a gauge of its available waters totally impracticable; but judging from the size of the different streams, at the places which our level would cross them, the length of feeder necessary to conduct them to the summit and

the declivity of the hills along which it would have to pass, I considered this route less favorable than the

A day or two before we completed the survey of the Allegheny, a deputation called upon us, from some of the inhabitants of the Driftwood branch of Sinnemahoning, presenting a letter from an intelligent gentleman in that quarter, in which he suggests from the best information which he can obtain, that a route favorable for a canal existed betwixt the _____ of the Driftwood and Clarion river; we then proceeded to that place and viewed the summit, found the ascent on the Sinnemahoning side of the river to be great, the ridge wide and flat, and the streams which could be commanded, small. Under these circumstances, it was not considered necessary to use any level upon it, being fully satisfied, that a sufficiency of water could not be obtained at so high a level.

We then proceeded to the ridge dividing Bennet's branch of the Sinnemahoning from Sandy _____ carried a level a considerable distance along its top, and likewise along the different streams, skirting its base on both sides, so as to ascertain the form of the ridge and streams which have their sources in it. This induced us in the first instance to drop 165 feet on each side below its lowest summit; but a continuation of our level down Sandy _____ about eight miles, satisfied me, that sinking 22 feet lower, would be advantageous, as such additional depression would enable us to command Fall's creek, near its lower fork, which is about one and three-fourth miles from its mouth and three-fourths of a mile above saw mill.

From a view of the face of the country around this summit and its streams as delineated by our levellings, I beg leave to suggest what would appear to me the best mode for its improvement.

A tunnel through the ridge of about 224 perches in length, a little more than 200 feet below its summit; although I do not think any shaft necessary for excavation would much exceed 100 feet.— A cut in the Sinnemahoning side 40 feet at the end of the tunnel and terminating at the minimum depth of cutting in 200 perches.— A cut on the Sandy side 35 feet at the end of the tunnel and terminating at the minimum depth at 600 perches. A dam and embankment at Shaffer's 80 perches in length and 12 feet in height, forming a reservoir which will cover about 250 acres, the surface to be four feet higher than the surface of the canal, making an extra embankment from the minimum depth to Shaffer's.

Fall's creek feeder would be $6\frac{1}{4}$ to $6\frac{1}{2}$ miles in length, the ground generally good excepting the ends of two hills which are steep, and three-fourths of a mile next to Fall's creek, which is rocky. The feeder necessary to conduct the south-east branch or Luther's creek to the dam at Shaffer's would be $1\frac{1}{4}$ to $1\frac{1}{2}$ miles in length, the ground favorable and of gentle declivity; the rest of the streams betwixt the dam and the dividing ridge, come in above the level of the proposed canal.

Sandy _____ near the dividing ridge is a sluggish stream winding its serpentine course through extensive flats composed principally

of clay, scarce a stone to be seen. Beaver dams are frequent, covered with grass, small bushes, or timber of small size; the remainder of the flats are heavily timbered with white pine, white oak brush, sugar, &c. The Sinnemahoning is favorable for cannalling for about seven miles from the dividing ridge (excepting a heavy growth of timber) and may be continued on the north side, for that distance. Below that, the hills are alternately washed by the stream and in several places present rocky and precipitous fronts, which may be avoided by eleven crossings. The cost of this section would about equal that above Coleman's on the Driftwood.

The dividing ridge is unusually free from stone upon its surface, covered with a growth of white pine, white oak, hickory, &c. composed of argellacious and slate so far as the washes upon its side disclosed,

It was conjectured that an additional supply of water could be obtained from Anderson's creek, and a level was extended up Birch run and along the Kersey road, to what had been pointed out to Mr. Mitchell, two years ago, by the inhabitants of that quarter as the lowest place in the ridge, we found its elevation above the level of the proposed pass, to be 315.99 feet; this project was therefore abandoned, believing, that little if any, of the waters of Anderson's creek, could be found above its level in dry seasons. — We then proceeded to Little Toby and upon examination found, that four streams which have their sources in Boone's mountain, (Elk mountain in the map) can be conveyed to the summit of Sandy, by the channel of Fall's creek,

From Bear to 14 mile run, is	3 miles 52 perch.
to Whetstone,	1 290
to Rattlesnake,	7 190
to pass of divide to end of Fall's creek,	1 198

In all, 14 miles 90 perch.

Should the experiment of supplying a summit by the application of steam power be found practicable and that used to elevate the waters of the three first streams about 90 feet, the distance might be much lessened from Whetstone to Rattlesnake. From Bear to Fourteen Mile run, the ground is not very favorable, being intersected in several places by deep ravines, and from Whetstone to Rattlesnake, similar difficulties present themselves; as also, steep hill sides, which do not show rocks upon their surface but their slopes indicate a rock formation. Coal abounds on those waters, as also, on Sandy and Sinnemahoning.

A succession of showers rendered impracticable a guage of the waters of Sandy, during the time we were employed upon it and when we had descended Bennet's branch for some distance, I returned as far as the dividing ridge for that purpose but was prevented by a shower and returned to levelling. The weather continued dry until we reached the junction of Bennet's and Driftwood

branches. We found the distance from the proposed pass, to be 627.37 feet, which is 179.68 feet lower than creek and 1397.69 above tide water.

A guage having been prepared upon Smeaton's plan, J. J. Wallis, Esq. returned with one of the hands to Sandy and gives the following, as the result of his measurement.

Summit creek, 7 inch. through and 12 in opening,	89 per minute.
Fall's creek, 8 $\frac{1}{2}$ do.	115
South east or Luther's, 5 $\frac{1}{2}$ do.	64

268 per minute.

I cannot say that this measurement was taken at the lowest state of the waters but am authorised to say upon the authority of Mr. Wallis, that the waters were lower at the time the guage was taken than they had been at any time prior to it, this season.

The guages of the streams issuing from Boone's mountain, had been taken when we were employed upon Little Toby, and are as follows.

Rattlesnake	58 cubic feet per minute.
14 miles	25
Whetstone	67
Bear run, say	58
	<u>208</u>
Deduct $\frac{1}{4}$ equal to low water,	52
	<u>156</u>
Waters of Sandy	268
Total	<u>424 cubic feet per minute.</u>

From this it would appear that the streams of Toby would have to be conducted over the dividing ridge in such manner as to avoid leakage and evaporation, and that a similar plan would have to be pursued with Falls creek feeder. That from the S. E. branch or Luther's branch, should be an open cut, emptying itself into the reservoir.

From a line of level which we ran round the ground which would be inundated by the reservoir, it cannot contain less than 250 acres, which I have reason to believe would be filled by those streams at the summit and Luther's creek.

From an assumed level we descended a small stream on the Sinemahoning side for two and a half miles, (fall 127.69 feet) which is then joined by another of larger size from the south. On the Sandy side no additional supply of water of any consequence comes in for about three miles, at which place a stream nearly equal to S. E. branch enters the creek.

I do not know that any series of observations have been made upon the highlands which separate the eastern and western waters, but judging from the drainage, which is in reality but the difference betwixt the quantity of moisture which descends and that which ascends, induces a belief, that the descent of moisture is

greater and the ascent less in high than in low regions, and would the difference in the weight of the atmosphere be likely to produce such an effect. I have endeavored to communicate all the facts connected with each of the routes, upon which I have been employed, and the schemes upon which the examinations have been founded, as no survey of a summit can be made, unless the person employed has some plan, as to practicability that is not for me to determine.

I am gentlemen, very respectfully, your ob't. servant;

WM. WILSON.

N. B. From the best information I could obtain, the distance from the West Branch, at the mouth Sinnemahoning to Allegheny at the mouth of Sandy, is about 100 miles.

Adding our distances from the end of the tunnel, to the month of Bennet's branch, produces,	40 miles 56 $\frac{1}{4}$	
Add to, mouth Sinnemahoning, about	15	
	<hr/> 55	<hr/> 56 $\frac{1}{4}$

No. 4.

To the Pennsylvania Canal Commissioners.

GENTLEMEN,

In pursuance of your joint instructions to William Wilson and myself, dated the 6th of June last, directing further explorations of the Sinnemahoning and of the West Branch of Susquehanna, I proceeded to the Susquehanna, it being the part allotted to me by a private arrangement with Wm. Wilson. My first effort was to ascertain the wishes of the citizens of Clearfield county, as to any particular pass they might desire to have explored with a view to a connection of the eastern and western waters. Their consultations on this subject resulted in giving me no positive directions as to any particular point in that county, but requested that a correct examination might be made from my former summit between the Cushing and Two-lick. Immediately on my arrival at this summit, I dispatched a messenger to the town of Indiana, requesting the citizens of that county, to meet me at the summit as early as possible, with a view of instructing as to the plan they might wish me to pursue in relation to the object for which I had been appointed. They promptly attended and their views corresponding with my own, we determined on the following plan. First.—That my survey should be made with a view to iron pipes, to convey the water to the summit level. Second.—That I should proceed from the summit to the Black Licks, and also ascertain the practicability of bringing in the Conemaugh, and Third.—To carry my levelling to the Chest and Big Mahoning creeks. In the execution of this plan, the following are the results.

I first ascertained the practicability of passing the Mahoning over the divide necessary to be passed, to bring it to the summit. This was effected by a cut of 12.67 feet in the centre, terminating at the

surface, both ways; whole distance fifty five perches; and which is represented on my draft at the connection of the Cushing and Little Mahoning. I then proceeded from the summit towards the Black Lick, carefully preserving the height of my summit and examining every pass on the intervening divides, that presented a prospect of shortening the distance between the two extreme points. A view of my draft will shew that in this, I was not very successful, as my route turned out to be a very circuitous one. In my passage from the waters of Brush creek to that of the Laurel run, and for the purpose of saving in distance, I have presented a cut of seventy-one feet in the centre, terminating both ways at the surface,—the bare line as represented on the profile, is eighty perches. This perhaps, could be more advantageously effected by a tunnel, in part the ground is entirely clear, and soil of slate; from here I passed down the Laurel run, to the white oak marked at Black Lick, being then three hundred and fifteen feet $\frac{1}{10}\%$ below the summit. The distance saved by the above cut, is between three and four miles. From the white oak, I continued my levelling a distance of two miles and one hundred and five perches, to a benched cherry on the divide, between Black Lick and the Cone-maugh river, at the east end of the town of Armaugh; this bench is seventy eight feet, $\frac{6}{10}\%$ below the summit. From here I returned to the white oak at Black Lick, and continued my levelling up that stream a distance of ten miles and two hundred and fifty-four perches, to a benched Buttonwood at the mouth of the Beaula branch, being two hundred and thirty feet $\frac{1}{10}\%$ below the summit. From thence up the Beaula Branch, a distance of four miles and one hundred and fifty three perches to a benched birch, on the west side of the creek, being the height of the summit:—Returned to the buttonwood and proceeded up the north branch a distance of four miles and thirty-four perches, to a benched sugar tree at the mouth of the Elk branch, being 54 feet below the summit; continued up the north branch one mile and 174 perches and benched on a birch tree, the height of the summit; returned to the sugar bench at the Elk branch, and ascended the same one mile and thirty four perches, benched on a birch, being the height of the summit. These waters were so much swollen by the late rains, as to prevent at this time, any correct measurement being taken; I therefore determined on returning for that purpose. From here I directed my course to the Chest creek, and commenced my levelling on that stream, at my former bench made in 1825; being one hundred and fifty-three feet $\frac{7}{10}\%$ above the summit; from this bench I continued down the creek eight miles and two hundred and sixty-five perches, and benched on a hemlock, being the height of the summit. This bench is four hundred and ninety six perches below Elder's mill, on Chest creek. At this place I measured the water, the result of which will hereafter be given. It will be proper here to observe, that this measurement was taken when Litsenger's mill, which is near seven miles higher up on this stream, was stopped; the dam of which at that time, would contain the water above for

at least six days;—the difference in depth of water when the mill was going, was at the place of measurement, observed to be two and a half inches, so that this measurement will be increased in quantity of water when the stream is permitted to flow regularly.

From here I returned to the summit and commenced a level line towards the Big Mahoning. The country laying immediately between the summit and that part of the creek, at which it is necessary to take out the water, being an entire wilderness without roads, and presenting much difficulty in transporting the necessary supplies for my party, induced me to take the circuitous route, as represented by the level line on my draft, for the advantage of a road. I however myself travelled over the country with a view of ascertaining its locality, and am of the opinion, that the divide necessary to be passed between Little Mahoning and Canoe creek, cannot be passed at a point nearer the direct course, than that represented on the draft by a benched white oak on the divide, being the height of the summit. I continued my level to Hoover's mill on Big Mahoning, a small distance below Puxatawney; from here I pursued the creek to a short distance above the mouth of Canoe creek, finding that above this; I would have much difficulty in pursuing the creek, owing to the frequent stoppages by drift and beds of laurel surrounding the stream and knowing from my former survey nearly the point at which I must arrive, I left the stream and pursued the course represented by the level line on my draft, until I arrived at the height of the summit, on the east branch of said creek, at which place I found the water so trifling as not to be worth measuring. Having thus ascertained all the facts relating to water that can be brought in aid of this summit, I with my party returned home.

The measurement of Chest creek resulted as follows.

Breadth of Come,	18 inches.
Height of do.	10 ⁶ / ₁₆

Producing as I have calculated it, two hundred and forty eight cubic feet per minute. Estimating the three branches of Black Lick, to produce double that quantity; a supposition which I am inclined to think is not too great. My opinion however, on this subject is founded; *First* from the appearance of the streams at the junction of the North and Beaula branches, before the rains had fallen; that afterwards raised the waters, and *Second*, from arriving at the height of the summit on the Beaula branch, the evening before the rain commenced, the streams at that time were thought to be at their lowest stage. This was on Saturday evening; when I returned on Monday morning, they had rose upwards of two feet. - Upon this supposition, the *sum total* of the water produced by the Black Licks and the Chest. will be seven hundred and forty four cubic feet per minute, and would fill a Lock of ten feet lift, eight by nine feet, six times in an hour.

The measurement of the Susquehanna branches, which you have in my report of 1825, are so small, that perhaps they are not worth

taking into the calculation, especially when we consider the expense at which they are to be got. I would here observe, that about the first of November, I returned to the Black Lick, in company with Mr. Whippo, the engineer detailed by the board, for the examination of that route, and *again* found the streams too high to admit of a correct measurement. I am therefore compelled to relinquish all hope of being able this season to give any further estimate of these waters.

I would further observe that an increase of water could be obtained, by erecting dams in the different streams where the water is taken out. I would say that on Chest creek, a dam of fifteen feet in height, would but little exceed twelve perches in length, and would back the water eleven hundred and eighty eight feet, the mean breadth of dam, one hundred and forty eight feet, the mean depth, seven and one half feet, and would contain

		1,318,680 cub. feet.
Beaula branch of Black Lick, the same.		1,318,680
Elk	of do.	1,318,680
North,	of do. with a dam	} 1,978,020
of the same heighth will contain		
		<hr/> 5,934,060 cubic feet.

Giving eight hundred and twenty four lock fulls, in addition to the before mentioned quantity of water. The summit level may be sunk forty eight feet in the centre, terminating at the surface each way at one hundred and fifty perches; by giving the excavation for the reservoir, a direction best suited to the ground, it can at a reasonable expense be extended to any size that may be deemed necessary.

I am aware that objections may be made to the size of the proposed lock. I merely suggest the propriety of building locks, that will afford the greatest advantages to be had from a certain limited quantity of water, and leave you to judge whether or not this quantity under any circumstances will warrant the improvement.

No actual location of a canal, has been made from this summit, to enable me to give a correct statement, as to the distance at which an additional supply of water could be had. At the junction of the Susquehanna and the Cushing, on the east side, and distant about four miles from the summit, with a lockage of two hundred and fifty seven feet, a small supply can be had, say at the lowest stage of water, about one hundred and fifty cubic feet per minute. On the west side about three miles from the summit, with a little more than a hundred and fifty feet lockage to below the forks of Two-Lick, will afford about the same quantity. Those streams last mentioned, three months out of the eight that the canal would be navigable in the year, would of themselves be sufficient to supply a canal.

Upon this system of piping it may be proper to observe that there are in many places, convenient to the line, the appearance of an abundance of iron ore, with convenient streams sufficient for

blast-furnaces. From this circumstance I have no doubt but contracts for the delivery of iron pipes could be had at a very low price. I would estimate the cost of pipes at one dollar and fifty cents per foot when laid, which would be seven thousand nine hundred and twenty dollars per mile.

The length of feeder pipes necessary.

Chest creek feeder	34 miles.
Black Lick up the north branch	31 "
Beaula branch	4 " 153 per.
Elk branch	1 " 34 "
Whole distance	70 187 *

Making the whole expense of pipes, five hundred and fifty nine thousand and seventy two dollars. Would not this be less expense than a tunnel of two miles? If then there should be water sufficient, the question arises, to what expense will we go to effect an entire water communication. If there should not be water sufficient, the next stream we turn our attention to, is the Conemaugh; the distance from where this feeder would unite with the present proposed line of pipes, and near the marked white-oak on Black Lick, to a place on the Conemaugh, called the Cedar Rock, is four miles, and one hundred and five perches; from that rock to the place necessary and proper to take out the water, the distance can be ascertained from the levels and surveys already made on that stream; say from the connected map made by Mr. Strickland in 1825. I will here observe that if the depression from the summit line, as given in my profile, should be considered too great, requiring too much strength of pipe, there will be no difficulty other than increase of distance in lessening it.

From the general character of the topography of this part of our country, in which two of our greatest rivers have their sources, the mind is at once satisfied that we have in Pennsylvania the most elevated ground perhaps in the United States, to contend with; and the circumstance of the west branch of Susquehanna passing through the great barrier and rising not only west of the Allegheny mountain, but the Laurel Hill and Chesnut ridge, points out to us the only route by which we can effect a water communication to connect those rivers. In this elevated part of our country, in which numerous streams have their source, they must necessarily be small and their descent rapid, each presenting a deep ravine. This being the fact, presents great difficulties in bringing to any one point on the divide, a sufficiency of water to effect an object in view. Having for many years had an opportunity of forming a correct judgment in relation to this fact, I hesitate not to say that unless the system of piping is adopted, no summit on that divide will ever in Pennsylvania be supplied with water sufficient to warrant an improvement of so much expense, and if iron pipes are adopted to the extent that is practicable, I hesitate not to say that a perfect and complete water communication can be obtained.

The Cushing summit and a small space of country around it, is evidently the lowest we have in Pennsylvania without a tunnel. The canal from this summit will pass westwardly down the Two Lick and Black Lick, and intersect the canal at the junction of the latter with the Conemaugh, two miles below where the law now terminates on that stream; how far the interference of these two improvements might make for or against the best interests of the state, I am at present not prepared to say. But for the sake of having *one* entire water communication, I will suggest the propriety of extending the rail road necessary to connect with the Juniata to a point at or near the junction of Black Lick and Cone-maugh.

Feeling an interest as great as any other man in the prosperity of our country, and being sensible of the fact, that to promote that object, much depends on a well regulated system of internal improvement by canals, yet at this time I feel it my duty to state, that without the adoption of iron pipes, any further explorations with a view to a connection of the eastern and western waters, must result in fruitless expense.

The object of this survey being *mainly* to ascertain the practicability of supplying a summit level with water, and I having adopted iron pipes to effect that object, precludes the necessity of my making any particular observations as to timber, soil or materials for the constructing of works. The pipes only requiring an excavation of two and a half or three feet.

All of which is respectfully submitted.

Signed,

J. MITCHELL.

No. 5.

Additional Report from John Mitchell, Esqr.

Washington, 4th December, 1827.

DEAR SIR,

Since the delivery of my report to the Canal Commissioners, from reflecting on the subject of iron pipes, I am induced to believe that I may have made the estimate of expense too low. The only data I had, upon which to found my estimate, was the cost of a ten inch pipe made in Baltimore, the expense of which is there, one dollar and ninety-five cents per foot;—my estimate was made in part, upon the ground that this pipe was furnished by an Air furnace, and made from pig; and part from my own knowledge and experience in the manufacturing of this kind of metal from the ore.—A sufficient quantity of pig metal to make a ton of pipes, will in Baltimore, cost not less than forty dollars, where a sufficient quantity of bog-ore used in a Blast furnace, constructed at the proposed banks near the line of pipes, to make the same weight of metal, will not cost more than seven dollars and fifty cents; upon this hypothesis, I presumed the price stated might have been sufficient; but reflecting that the Baltimore pipe is perhaps not of sufficient size, strength or weight to furnish the mean weight of that which

in this case would be necessary; I am induced to make this further communication on that subject.

The Baltimore pipe weighs twenty-four pounds to the foot, at \$1 50 cents, is \$40 50 cents per ton. Judge M'Kinney of Centre county, under a contract with the government, has delivered at this place (Washington) three hundred tons of Kentlege, at forty dollars per ton, and with a reasonable profit to himself; this Kentlege is also Flashed, where cast,—I am aware that the pipe is more expensive to cast than the Kentlege, but the difference does not exist in furnishing the metal, but mainly in the charge of the moulder, this difference is put against the carriage of the Kentlege over two hundred miles, and the profit to the manufacturer,—I would further observe, that upon the principle that the state will under the direction of salary managers, erect the furnaces, the advantages arising from the contiguity of materials, as also from the low price of labor and provisions in the western country, the article can be furnished at a price vastly below any estimates that may consistently be drawn from the Baltimore and Philadelphia prices.

As this subject of pipeing is new, and we cannot from actual experience in this particular case, be furnished with any correct data, upon which to make our calculations, either as to the cost, or even size of the article, I therefore hope that any difference of opinion which may arise on this subject, will not be considered on either side, as marks of favor, or hostility to the measure.

I would respectfully draw the attention of the Engineer Mr. Whippo, to the subject, as relates to the size of the pipe necessary to carry the water measured in Chest creek, as also the difference between the quantity of water vented through a close pipe, and that through an open trunk of the same capacity, allowing the same descent in both cases.

I have to request the favour of you, to have the above added to my report when published.

I have the honor to be respectfully,

Your most obedient servant,

JOHN MITCHELL.

No. 6.

Having performed the second duty assigned me, I proceeded to the third, of which the following detailed instructions from Mr. M'Ilvain, will give a full and perfect view.

SIR,

By an act of the last session of our legislature, the canal commissioners were directed "to cause further examinations to be made with a view of ascertaining the practicability and cost, of an entire navigable communication, between the Susquehanna and Allegheny rivers."

Shortly after the law was passed, several gentlemen of the legislature, who felt themselves particularly interested, addressed a letter to the board, in which they suggested the mode of prosecuting these inquiries, which seemed to them most economical and effec-

tive. In compliance with such suggestion, Messrs. Wm. Wilson and John Mitchell, were dispatched, each with a competent party and with instructions to examine every possible point of connection between the eastern and western waters, which had not been previously explored. These instructions have been faithfully executed, and it only remains, in order to complete the plan adopted, that a professional engineer of known skill and experience, shall view the summits which the examinations already made have shewn to be the most favourable, and report to the board his opinion on the subject.

The commissioners having assigned to you this interesting duty, you will proceed with Messrs. Wilson and Mitchell as early as possible, to the several points which they shall represent to be worthy of your attention. These points are as I understand but two in number, namely, one surveyed by Mr. Wilson, at the head of Bennet's branch; and the other by Mr. Mitchell, near the head of the west branch of the Susquehanna. It is believed that these gentlemen have taken the levels and made the measurements of water, with such care as that after viewing the ground, you may safely rely upon their notes, as the basis of your opinion. If however you find any thing of importance has been omitted, you will cause the deficiency to be supplied by additional examinations, with the least possible delay.

The single question submitted to you for decision is, whether at either of the points, which you are about to visit, a permanent navigable communication, sufficiently supplied with water to answer the purposes of an active and valuable trade, be practicable or not. So far as the previous examinations, and the local knowledge of Messrs. Wilson and Mitchell, throw light upon this question you will use them freely. And you will take care to collect for yourself such further materials as you may deem necessary. It is the wish of the board to arrive at certainty, upon a subject which has agitated and divided the public mind, and they will expect from you a detailed report, giving such reasons for your opinion as will be satisfactory to all who take an interest in the subject.

The notes of Messrs. Wilson and Mitchell will of course be at your service. They will exhibit to you also the instructions under which they acted, and give you such other assistance and information as you may require.

In conclusion allow me to remark, that the accomplishment of a complete water communication between the eastern and western waters, is a subject of intense interest to this commonwealth, and would materially enhance the value of our projected improvements. It is hoped therefore that no expedient that can lead to success, will escape your attention; upon your zeal, activity and competence, the utmost reliance is placed.

Very respectfully, your ob't. servant,

Signed

JOS. MILVAINE.

CHAS. T. WHIPPO Esq.

Pennsylvania Canal office, Oct. 14, 1827.

In pursuance of these instructions I proceeded to Curvinsville, on the Susquehanna river, where I met Messrs. Wilson and Mitchell, and on the morning of the 29th, of October, after having made the necessary arrangements, we proceeded to the summit, lying betwixt the Sandy Lick and the Sinnemahoning. This summit is five miles and sixty chains long, and the amount of water which can be brought upon it is 424 cubic feet per minute, which will be supplied by the following streams, viz. Summit creek, Fall creek, South east or Luther's branch, Rattlesnake run, Fourteen mile run, Whetstone run and Beaver run. Below this summit on the the west side passing down the Sinnemahoning four miles, an additional supply will be obtained equal to 59 cubic feet per minute. On the other side, following the Sandy Lick four miles and sixty three chains, 50 cubic feet per minute will be obtained. Thus the whole quantity of water which will be supplied by streams is 533 cubic feet per minute, and the whole length of the canal to which this quantity is applicable, is fourteen miles and forty three chains. We therefore perceive that allowing the requisite quantity here for evaporation and filtration to be equal to that upon other canals, viz. 50 cubic feet per minute for each mile, that these two items would amount to 722 cubic feet per minute, which exceeds that of the above mentioned supply, by 189 cubic feet per minute. To compensate for this deficiency and to obtain a supply for the locks, it is proposed by Mr. Wilson to construct an extensive reservoir in the valley of Sandy Lick. It is to cover 250 acres, and its surface is to have an elevation above the surface of the canal of four feet, so that the whole of its contents to that depth in case of necessity, may be used. This reservoir allowing it to average four feet deep, would contain forty three millions five hundred and sixty thousand cubic feet of water, equal to 252 cubic feet per minute for a period of four months. From this if we take the above mentioned deficiency of 189 cubic feet, there remains only 63 cubic feet for the supply of the locks, a quantity so palpably inadequate, that it is unnecessary to say more on the subject.

Before proceeding to the detail of my examinations on the summit, lying betwixt the Cushing and the Two Lick, it may be proper to make some remarks on the expense of iron pipes, through which water must be conveyed to supply it.

In order that I might be enabled to speak with some confidence on this subject, I obtained an introduction through Mr. M'Ilvaine, to Mr. Frederick Graff, superintendant of the water works at Philadelphia, who probably possesses more practical information on this subject than any other man in the state, or perhaps in the union. This gentleman very obligingly, answered all the enquiries which I had to make, and also furnished me with a report of the watering committee, for the year 1818. This with the subsequent reports up to 1824, which were furnished me by Mr. M'Ilvaine, contain all that is most interesting on the subject of cast iron pipes. They furnish tables of pipes of different sizes and length, their weight, capacity and expense, and as these are all deduced from experi-

ence, founded upon the best theories of some of the ablest and most scientific men, we cannot for a moment doubt their accuracy.

Availing myself of these advantages, and aided by the valuable collections in Rees' Encyclopædia on this subject, I am in hopes to give such a view of it, at least so far as relates to the expense, as to satisfy the minds of all who may be interested.

Mr. Mitchell in running his feeder lines, has made no calculation for descent, and the only way that can be obtained, is by cutting down the summit, which he informs us can be done to the extent of forty-eight feet. This however, will be extremely expensive, but as the object is great, it would not perhaps, be considered an insuperable objection, and we will therefore take for granted, that a descent of fifty feet in this way, and by means of dams at the heads of the feeders, might be obtained. Now having given the descent and the quantity of water per minute, the question arises, "how large must the diameter of the pipe be?"

In this calculation, a large allowance must be made for the friction on the inside of the tube: and the bore of the tube must be greater, in proportion to this friction. This will be verified by an experiment made by Desagulier's, on a leaden pipe, whose inward diameter was $1\frac{1}{2}$ inches. In this experiment, he found at fourteen hundred yards distance from the spring that supplied it, it did not give a tenth part of the water that it would have given, at 30 yards from the spring.

A great many ingenious experiments have been made by men of science, for the purpose of establishing a theory, by which this friction could be accurately calculated. Amongst those who have given much attention to this subject, are Eytelwein, M Du Bual, Dr. Young and Smeaton. These men by long continued application have succeeded in framing rules reduced to mathematical certainty, and applicable to all occasions, so that we are no longer in doubt on this subject. In my calculations in the case in question, I have used the formula of Dr. Young as laid down in Rees' Cyclopædia, under the article water.

By this formula, I find that the tube for the Chest creek feeder which is 34 miles long, allowing it to lie straight on a regular inclined plane, must be twenty five inches in diameter, but should the pipe conform to the shape of the country, as it undoubtedly must, making great angles of ascent and descent, its capacity would be very materially lessened, but how much cannot at this time be stated, for the want of a more minute knowledge of the country. In conversation with Mr. Graff on this subject, he gave it as his opinion, judging from his own experience, that if the country was very rough, the consequent increased friction would be equal to a large portion of the water which the pipe was intended to discharge. To make a proportionate allowance in the size of the pipe, it is evident, would swell the expense to such an amount as entirely to defeat the object. I will therefore adopt my calculations to a more favorable route, hoping that such can be found, and suppose that two

additional inches only to the diameter of the tube, will give it a capacity equal to all contingencies.

The next subject of enquiry, is as to the thickness of the tube. This will depend in a great measure, on the weight which it is to sustain, and this will be greater or less, in proportion to the head of water. Knowing very nearly the strength of cast iron and the weight of water, we might calculate pretty satisfactorily what would be required, but upon this subject, I shall be better satisfied to take the opinion of Mr. Graff.—He says that these tubes will require to be at least three quarters of an inch thick on an average. Some may be less, but where the pipe is laid much below the head, they must be proportionably thicker.

With this thickness, the superficial cross section of iron in the twenty-seven inch pipe, will be equal to 65 4 inches, which being multiplied into the whole number of inches in 34 miles gives 140,887,296 cubic inches, which allowing 3^d cubic inches to be equal to ten pounds weight, is equal to 39,123,392 lbs. or 17,462 tons.

The other tube for bringing down the branches of Black Lick, making all the calculations as above, must be 36 inches in diameter, including the allowance for increased friction. This allowance, as in the other case, has been perdictated upon a hope that a more favorable route can be found, than from the statements of Mr. Mitchell we could reasonably expect. This tube being also $\frac{3}{4}$ of an inch thick and 36 miles long, will contain 54,869,760 lbs. equal to 24,495 tons.

Our estimates may be made by the ton or by the foot. In conversation with Mr. Samuel Richards on this subject, who is extensively engaged in iron works, and who has the contract for furnishing castings for the city water works, he assures me, that sixty dollars per ton, is a fair price for tubes of the above size and description. Making the estimate in this way then, viz: 41,956 tons at sixty dollars per ton amounts to two millions five hundred seventeen thousand three hundred and sixty dollars. But this does not include the interlaps or the expense of laying. As there are items which cannot at this time be very conveniently estimated, it would be more satisfactory to be governed by the prices which have been established by experience. In the city of Philadelphia, Mr. Graff informs me that twenty inch pipe has cost when laid, seven dollars forty-two cents per foot run, the pipes alone cost five dollars per foot. But the pipes in question being much larger would cost more. He mentions a piece of pipe twenty-four inches in diameter, and seven miles long near the city of New-York, which was estimated to cost eleven dollars per foot when laid, and he thinks the materials and the work could have been obtained as cheap there, as in the city of Philadelphia. This is more directly applicable to the case in question, on account of the similarity of size. Mr. Mitchell says an abundance of iron ore can be found in the vicinity of these feeder lines, and believes on this account castings might be obtained very reasonable. We will therefore suppose, although the greater portion of the pipe in question, is a foot larger than that for

which the above estimate was made, that with this advantage these pipes may be furnished and laid with the same expense. The estimate being made in this way, viz: 369,600 feet at 11 dollars per foot run, amounts to 4,065,600 dollars, and if to this item we add that of cutting down the summit level, to say nothing of the great amount of lockage here, and we should swell the estimate to very near five millions of dollars.

These calculations have led to a result totally different from what I had expected, producing an item of expense so serious and so formidable that it would seem almost entirely to settle the question as to the practicability of the route. But, if it should still be said, that to make this improvement is of such intense importance that the state would be willing to forego any considerations of expense in order to effect it, it then becomes necessary to go a little further and enquire whether after all, there is any well grounded hope of its answering the desired object.

This depends principally upon the supply of water on the summit level, and this supply Mr. Mitchell informs us is equal to 744 cubic feet per minute.

The length of the canal to which this is applicable is seven miles, upon which after using the requisite quantity for evaporation and filtration, viz: fifty cubic feet per minute for each mile, there remains only three hundred and ninety-four cubic feet per minute for the use of the locks.

This with locks of ten feet lift, and equal in other respects to those of the Pennsylvania canal, would be sufficient to pass twenty one boats over the summit every twenty-four hours. This is the most favorable view that can be taken of this subject.

The above is respectfully submitted,

Signed by CHARLES T. WHIPPO, *Engineer*.

Philadelphia, Dec. 14, 1827.

No. 7.

To the Canal Commissioners of the State of Pennsylvania.

GENTLEMEN—

Pursuant to instructions received from the president of your honorable board, I commenced my operations at the north bounds of this state, and after having taken such levels of the Tioga and north branches of the Susquehanna river, from thence to the village of Athens, as were needful, to enable me so to locate dams across them, near this village, as to obtain a competent supply of water therefrom, for either of the canal routes, without causing the water of the ponds thus created to set back into the state of New York. I proceeded to locate the most eligible route for a canal of the dimensions specified in those instructions, (to wit: 28 feet broad at bottom, 40 feet at top and 4 feet deep) on both sides of that river, from the village of Athens to the town of Northumberland; and now have the pleasure of presenting to you herewith, maps, plans, profiles and estimates thereof.

I have the honor to be, gentlemen, very respectfully, your obedient servant,

JOHN RANDEL, Jr. *Engineer*;

Harrisburg, Dec. 20, 1827.

The following summary (taken from my report in detail of estimates and descriptions) will exhibit at one view, the estimated cost of making each mile of canal, from Athens to Northumberland along both sides of the north branch of the Susquehanna river.

West Canal Route.

East Canal Route.

West Coast Route.				East Coast Route.			
Mile	1st	\$3,491 05	Athens.	Mile	1st	\$3,898 55	Athens.
	2d	4,685 15½			2d	7,328 72	
	3d	3,020 27½			3d	10,654 02½	
	4th	3,228 75			4th	25,583 88	
	5th	2,807 10			5th	4,508 15	
	6th	22,648 81			6th	5,363 55	
	7th	24,031 11			7th	3,231 47½	
	8th	4,236 30			8th	4,650 40	
	9th	6,061 85			9th	10,284 20	
	10th	3,702 52½			10th	28,022 72	
<hr/>				<hr/>			
\$77,912 92½				\$103,525 66			

West Canal Route.

Cost of 30 miles \$349,454 54½

Mile	31st	\$16,707	35
	32d	27,565	60
	33d	18,082	16
	34th	2,804	77½
	35th	4,284	50
	36th	31,429	60
	37th	7,670	40
	38th	8,813	67
	39th	16,347	45
	40th	24,021	52

\$157,727 02½Cost of 40 miles, \$507,181 57

41st	\$3,301	15
42d	3,204	30
43d	4,763	08
44th	25,395	92
45th	31,429	60
46th	18,979	50
47th	12,928	93
48th	5,134	70
49th	19,152	00
50th	31,852	80

\$156,141 98Cost of 50 miles, \$663,323 55

51st	\$5,978	40
52d	22,299	50
53d	19,432	79
54th	2,865	10
55th	8,338	13½
56th	3,331	70
57th	4,401	50
58th	14,444	24
59th	23,047	56
60th	5,111	75

\$109,250 67½Cost of 60 miles \$772,574 22½*East Canal Route:*

Cost of 30 miles, \$388,983 94

Mile	31st	\$7,303	00
	32d	2,716	40
	33d	16,870	83
	34th	27,565	60
	35th	27,565	60
	36th	5,182	50
	37th	4,551	87
	38th	4,611	58
	39th	4,311	26
	40th	7,644	82½

\$108,523 46½Cost of 40 miles \$497,307 40½

41st	\$27,565	60
42d	27,565	60
43d	29,497	60
44th	12,290	65
45th	4,448	50
46th	10,235	34
47th	7,117	37½
48th	20,912	25
49th	8,640	72½
50th	4,455	65

\$152,729 29Cost of 50 miles \$650,036 69

51st	\$18,647	54
52d	10,106	11
53d	12,679	29½
54th	17,875	57
55th	17,291	78½
56th	26,204	80
57th	18,398	63
58th	11,493	70
59th	14,152	50
60th	29,497	60

\$176,347 53Cost of 60 miles \$826,384 22

*West Canal Route.**East Canal Route.*

Cost of 60 miles \$772,574 22½		Cost of 60 miles \$826,384 22	
Mile 61st	\$6,710 03	Mile 61st	\$18,245 09½
62d	26,204 60	62d	4,436 05
63d	26,204 60	63d	2,898 97½
64th	26,204 60	64th	4,275 75
65th	16,919 83	65th	17,259 45
66th	11,922 40	66th	18,279 95
67th	7,430 42½	67th	18,750 90
68th	16,333 15	68th	18,583 20
69th	17,617 16	69th	9,058 25
70th	6,584 10	70th	15,976 20
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\$162,130 89½		\$127,763 82	

Cost of 70 miles \$934,705 12 Cost of 70 miles \$954,148 04

71st	\$8,494 14	71st	\$10,459 33
72d	28,649 90	72d	4,047 57½
73d	30,412 78	73d	5,771 05
74th	10,659 27½	74th	16,953 33½
75th	8,146 80	75th	11,958 14
76th	12,903 70	76th	5,649 50
77th	15,465 56	77th	13,409 13
78th	17,217 91	78th	13,535 61
79th	36,309 52	79th	13,973 84
80th	2,977 12½	80th	14,659 84
<hr/>		<hr/>	
\$171,236 71		\$110,417 40	

Cost of 80 miles \$1,105,941 83 Cost of 80 miles \$1,064,565 44

81st	\$3,148 40	81st	\$17,835 29
82d	8,782 39	82d	3,875 12½
83d	20,967 58	83d	8,441 33
84th	8,568 75	84th	31,852 80
85th	5,067 70	85th	23,287 68
86th	18,079 04	86th	6,963 42
87th	14,028 02	87th	4,875 40
88th	4,404 30	88th	34,852 80
89th	20,720 30	89th	10,551 20
90th	16,223 90	90th	8,636 45
<hr/>		<hr/>	
\$119,990 38		\$151,221 50	

Cost of 90 miles \$1,225,932 21 Cost of 90 miles \$1,215,786 94

West Canal Route.

Cost of 90 miles \$1,225,932 21

East Canal Route.

Cost of 90 miles \$1,215,786 94

Mile 91st	\$4,442 86
92d	5,846 05
93d	8,338 00
94th	19,356 25
95th	5,595 22
96th	5,572 38
97th	4,031 67
98th	8,138 86
99th	14,930 54
100th	31,893 56

\$107,995 39

Mile 91st	\$10,372 80
92d	40,636 00
93d	42,232 00
94th	6,105 92½
95th	10,535 12½
96th	6,122 72½
97th	16,150 00
98th	14,715 38
99th	35,089 56
100th	4,012 40

\$175,391 91½Cost of 100 miles \$1,323,782 33 Cost of 100 miles \$1,391,178 85½

101st	\$4,115 67½
102d	5,370 40
103d	3,325 57
104th	13,399 54
105th	8,140 00
106th	19,394 40
107th	4,970 00
108th	4,421 60
109th	9,089 35
110th	16,154 98

\$88,381 51½

101st	6,645 65
102d	6,303 97
103d	9,865 02½
104th	30,225 05
105th	13,629 52½
106th	4,590 70
107th	6,384 62½
108th	13,095 80
109th	10,416 60
110th	16,060 31½

\$117,217 26Cost of 110 miles \$1,412,163 84½ Cost of 110 miles \$1,508,396 11½

111th	\$8,889 10
112th	9,266 20
113th	14,259 44
114th	5,154 50
115th	16,583 48
116th	5,855 78
117th	12,402 45
118th	5,351 50
119th	5,336 83
120th	2,580 00

\$85,679 28

111th	\$16,586 83½
112th	9,732 86½
113th	24,859 20
114th	5,372 62½
115th	4,003 30
116th	7,192 36
117th	12,460 17
118th	6,718 70
119th	21,024 20
120th	9,343 12½

\$117,293 38½Cost of 120 miles \$1,497,843 12½ Cost of 120 miles \$1,625,689 50

West Canal Route.

Cost of 120 miles \$1,497,843 12½

Mile 121st	\$5,347 10
122d	8,162 12
123d	4,918 61½
124th	9,553 62½
125th	24,563 75
126th	20,043 15
127th	2,750 00
128th	4,909 35
129th	4,414 85
130th	6,259 22

\$90,951 78

Cost of 130 miles \$1,588,794 90½

131st	\$5,266 93
132d	3,935 07
133d	3,742 55
134th	4,560 15
135th	4,280 87
136th	4,885 40
137th	3,714 45
138th	3,954 30
139th	7,714 75
140th	22,790 20

\$64,844 67

Cost of 140 miles \$1,653,639 57½

141st	\$3,536 87½
142d	4,627 67
143d	7,485 85
144th	7,078 12½
145th	4,796 00
146th	4,500 15
147th	7,013 42
148th	3,746 25
149th	7,827 42
150th	12,371 37½

62,983 13½

Cost of 150 miles \$1,716,622 71

East Canal Route.

Cost of 120 miles \$1,625,689 56

Mile 121st	\$9,568 60
122d	13,883 50
123d	5,600 60
124th	6,237 80
125th	15,216 46
126th	4,321 45
127th	7,628 40
128th	3,691 95
129th	4,386 90
130th	17,073 70

\$87,609 36

Cost of 130 miles \$1,713,298 86

131st	\$12,507 00
132d	11,447 20
133d	4,723 72½
134th	24,730 50
135th	25,159 20
136th	16,913 10
137th	24,859 20
138th	27,565 60
139th	28,984 80
140th	50,389 60

\$207,279 92½

Cost of 140 miles \$1,920,578 78½

141st	\$22,117 77
142d	6,563 85
143d	17,405 82
144th	15,150 40½
145th	2,455 50
146th	11,550 00
147th	4,110 30
148th	4,464 20
149th	2,606 40
150th	10,608 80

\$97,003 05½

Cost of 150 miles \$2,017,611 84

*West Canal Route.**East Canal Route.*

Cost of 150 miles	\$1,716 622 71.	Cost of 150 miles	\$2017,611 84
Mile 151st	\$24,102 15	Mile 151st	\$13,029 19
152d	4,156 50	152nd	3,414 75
153d	3,460 62 $\frac{1}{2}$	153d	4,719 90
154th	4,918 87 $\frac{1}{2}$	154th	4,927 90
155th	4,692 50	155th	4,185 25
156th	3,816 87 $\frac{1}{2}$	156th	10,480 80
157th	5,653 54	157th	3,924 15
158th	6,751 93	158th	8,706 89
159th	3,797 00	159th	7,929 04
$\frac{67}{80}$ th of 160th	5,695 96 $\frac{1}{2}$	160th	18,060 00
<hr/>		<hr/>	
\$67,045 95		\$79,382 87	

Cost of 159 $\frac{67}{80}$ miles \$1,783,668 66. Cost of 160 miles \$2,096,994 71

* To the junction of the North and West branches of the Susquehanna river. 161 \$5,212 28 } To North-
 $\frac{74}{80}$ of 162 4,171 25 } umberland
 bridge.

\$9,383 53

Cost of 159 $\frac{67}{80}$ miles \$1,783,668 66. Cost of 161 $\frac{74}{80}$ miles \$2,106,378 24

9,500 00	Dam across river at	
	Athens	9,500
10,000	Do. Horse Shoe,	10,000
12,500	Do. Nanticoke,	12,500
13,000	Do. Nescopeck,	13,000
24,000	Do. Regulating or	
	guard locks	24,000
	Lift locks (provided	
	the lock chambers are	
	made of wood and	
60,000	stone,	60,600

Aggregate \$1,913,268 $\frac{66}{100}$ Aggregate \$2,235,978 $\frac{24}{100}$

The aggregate cost (exclusive of the usual allowance for contingencies, &c.) of making the canal from *Athens* along the *East side* of the Susquehanna river, to the Northumberland bridge (161 $\frac{74}{80}$ miles) is estimated at \$2,235,978 $\frac{24}{100}$.

And from *Athens* (beginning $\frac{1}{2}$ a mile below the commencement of the east canal) along the *West side* of the river, to the junction of the north and west branches of the Susquehanna, at the town of Northumberland, the canal (159 $\frac{67}{80}$ miles in length) is estimated to cost \$1,913,268 $\frac{66}{100}$.

A canal route, more eligible in point of economy, than either of the preceding, may be obtained, by crossing the river at several points, so as to avoid serious obstacles and take advantage of the ground, as follows.

Commencing at the town of Northumberland, and proceeding up along the west shore of the Susquehanna river to the Wyoming valley (this distance is 56 miles, and can be made at an averaged cost of not more than \$8,500 per mile;) and thence continuing up along the same side of the river, a further distance of 25 miles, to the 79th mile station nearly opposite the Buttermilk falls, cross the river at this place, by a dam and floating towpath bridge, and proceed up along the east side thereof 64 miles, to a point nearly opposite to the town of Towanda, or Meansville; here re-cross the river by a dam and floating tow bridge, and continue up along the west side thereof 16 miles to the commencement of the west canal route at the Village of Athens.

The cost of making a canal along this route, is estimated at \$1,805,587 78½, as follows; (see the preceding estimated cost for each mile.)

Section No. 1. From Northumberland to the 104th mile station at the foot of the Wyoming valley.—distance 56 miles.	\$483,675 14½
No 2. From the foot of the Wyoming valley, 25 miles, to the 79th mile station, nearly opposite the Buttermilk falls.	\$247,028 81½
No. 3. From the Buttermilk falls, 64 miles to a point nearly opposite the town of Towanda.	843,541 59
No. 4. From the dam to be located near Towanda, to the beginning of the west route canal at Athens, 16 miles.	166,742 23½
Dam and feeder at Nescopeck,	13,000 00
“ “ Buttermilk falls,	12,500 00
“ “ Towanda,	10,000 00
“ “ Athens,	9,500 00
Regulating or guard Locks,	24,000 00
Lift Locks,	60,600 00
Making an aggregate of	<u>\$1,820,587 78½</u>

Which amounts to an average of \$11,308 per mile, for the 161 miles.

The canal may cross the river, from the head of the Wyoming valley on the west side, to the head of the Lackawannock flats on the east, instead of crossing at the Buttermilk falls, the dam intended for that place, being removed to a point between the falling springs and Lackawannock creeks;—but an extra cost will be incurred thereby.

Respectfully submitted,

JOHN RANDALL, Jr. *Engineer.*

Harrisburg, 20th December, 1827.

To the Board of Canal Commissioners of the state of Pennsylvania.

GENTLEMEN,

In compliance with the instructions of the board, directing me to "ascertain the practicability of a water communication between the city of Philadelphia, and the present termination of the Pennsylvania canal, near the mouth of Swatara;" and in addition thereto, "to commence on the south bank of Swatara, at a point opposite to the Pennsylvania canal, and to trace the continuation of that canal down the eastern margin of Susquehanna river, as far as the season and the completion of other surveys to which my attention was directed, would permit;" I have the honor to report as follows:

As the most obvious route for a water communication between Philadelphia and the Susquehanna river is through the Great Valley of Chester county, I therefore commenced and directed the preliminary surveys through that valley, beginning at the point where it leaves the Schuylkill river, about nineteen miles above Philadelphia, and progressed with the necessary levels along the margin of the valley-forge-creek, to the summit ridge, near the White Horse tavern, dividing the waters of that creek from the west valley creek; and after allowing such a depression at that summit, as would come within the reach of a reasonable economy in excavation, and keeping the line sufficiently low to admit into a canal such streams as were superior to it, a line of canal was then traced and continued along the face of the south side of North Valley hill, passing over the East Brandywine, immediately above Downingstown, and terminating this level at a point about a mile east of Gardiner's house, where the ground begins to rise rapidly towards the apex of the ridge between the waters of East and West Brandywine.

Ascending then over favorable ground to the next assumed level at Gardiner's, the line was continued to the West Brandywine, which it crossed about Coatesville, near to Yersley's mill. From thence we ascended, with a series of levels, for five miles farther, to a point near Park's tavern, intersecting in the course, Buck run, and the summit ridge, between it and West Brandywine. Three fourth's of a mile west of Park's ground was attained, which begins the "summit level," five miles east from the gap in Mine Ridge at Henderson's; from thence to the Gap, the line passes over the eastern and middle branches of Octoraro creek, and the elevation of it above the tide waters of Schuylkill, was found to be 588 feet, differing only one foot from the result given in the report of the Pennsylvania canal commissioners, of 1825.

In addition to the surveys thus briefly detailed, an experimental line was extended along the Mine ridge for ten miles west of the Gap, in order to find a lower depression in that ridge, and to ascertain what further supplies of water could be obtained in that direction. A line was also carried to those head branches of Pequea

creek, that might be advantageously conducted into the summit level; and a reconnoissance was made of the country, embracing a more southern route for a canal, than that through Chester valley. Diverging from the line at the Octoraro summit, I passed through the valley of Buck run, to its junction with West Brandywine, thence down the margin of that stream to the main branch, then crossing the dividing ridge between the latter and west branch of Chester creek, to the southward of West Chester, and continuing eastward, I crossed the deep beds of Ridley, Crum and Darby creeks, and reached the Schuylkill below Philadelphia. This examination resulted in the conviction of the impracticability of locating a canal through a country presenting so many and various configurations of soil.

As before stated, the surveys and examinations with the view to a canal through Chester valley, were terminated at the Gap, being the lowest depression in the Mine ridge. it was considered unnecessary to extend the summit level any further westward, and as the experimental line was only carried towards the head branches of Pequea creek, for the purpose of ascertaining the length of feeder, and the quantity of water which could be conducted from them into the summit level to the Gap, I will now proceed as far as my limited time will permit me, to put together the results of the different investigations, and to detail briefly the amount of supplies of water, and from whence obtained.

As the season of the year in which the survey was progressing was unusually dry, it afforded a favorable opportunity for determining with accuracy, the mean quantity which could be obtained from the different streams intersected by line, I therefore devoted a considerable portion of time to this branch of the investigation, particularly as the practicability or impracticability, of the canal would depend upon the result.

The streams which can be brought to supply the summit level, are West Brandywine (at Beaver dam) including smaller branches, Buck run and its tributary; East branch Octoraro, Middle do. do.

And for the lower levels towards Schuylkill, East Valley creek. West do. do.

West Brandywine was first measured at Yearsley's mill above Coatesville, and the quantity delivered at his flumes was found to be 12.42 cubic feet per second, preferring the simple formula of Eytelwine to those of Bossut and De Buat, given in Robinson's Mechanical Philosophy, I now give the discharge of those streams which can be conveyed into the summit canal.

West Brandywine measured at Mucklecluff's mill below the Beaver dam, the quantity discharged by his flumes was 5.05 cubic feet per second, and the stream at that point was only capable of furnishing water in the driest season to work his mill six hours per day. The rate of supply which the stream affords in 24 hours is therefore only 1.262 cubic feet per second. This measurement was compared with the quantity delivered at Hatfield's mill, which is one

mile below Mucklecluff's, and was found accurate, making due allowance for the additional quantity the lower mill received.

Park's mill, Buck run, delivered 1.44 cubic feet per second and could work 8 hours per day: the rate of supply in 24 hours is 0.480 cubic feet per second. The Branch run near Park's tavern has gauged and yielded 0.173 cubic feet per second. Comparing these results with James Trueman's mill, which is about one mile below Park's, the quantity which his flumes delivered was 3.06 cubic feet per second, and worked 6 hours. Rate in 24 hours is 0.765, which allows for the addition of several springs received into his mill pond, as well as the branch at Park's tavern, hence the near coincidence.

Cloud's mill on the East branch of Octoraro, discharged at its flumes 4.70 cubic feet per second, and works 6 hours per day, rate in twenty-four hours 1.175 cubic feet per second.

Middle branch, gauged 0.275 cubic feet per second. Pequea creek at Wilson's distillery, which is at a depression of 80 feet below the level of the summit tunnel, delivered 2.36, and could work in dry season 4 hours per diem. Rate in 24 hours 0.395 cubic feet per second.

Main stream, at same depression, gauged 2.09 cubic feet per second, making in all 2.485 cubic feet per second.

I will here remark, that I found it impossible in several instances to verify the results obtained from the measurement of the flumes at the mills, by gauging the stream itself for the mean quantity on account of the stoppage of water by the mills above.

Summary for summit level.

West Brandywine,	1.26	cubic feet per second.
Buck run,	0.480	" "
Branch at Park's,	0.173	" "
East Octoraro,	1.175	" "
Middle branch,	0.275	" "
Pequea creek,	2.485	" "

Total, 5.850

The streams west of the gap on the Mine ridge, yield in all 1.582 cubic feet per second, and they are from four to seven miles distant from the summit.

East Valley creek at Brook's mill, discharges 6.24 cubic feet per second, and the West Valley creek at Trimble's saw mill, which was verified by gauging, delivers 0.425 cubic feet per second. Adding to this Robert's run and Beaver creek, north west of Downingstown, gives 0.675 cubic feet per second.

From the statement exhibited by the table of quantity of water discharged by the streams, on the route of the Chester valley canal, it will be at once perceived, that they are inadequate to the supplies requisite for the mills, and the amount afforded would not even compensate for the losses sustained from evaporation, filtration, and lock leakage on a canal from Philadelphia to Susquehanna river.

Whatever might be the additional supplies obtained from the water courses to the west of Pequea creek, I feel satisfied that they would not be an equivalent for the wastage on a canal through the porous and treacherous limestone soil of Lancaster county.

Having ascertained the impracticability of locating a canal from Philadelphia, through Chester county, across the summit at the gap of Mine ridge, and thence through the valley of Lancaster county to Susquehanna river. I proceeded immediately to comply with the further instructions of the board, in the extension of the eastern section of the Pennsylvania canal at Swatara, and now submit the following estimate of expense of that portion of the line which was explored to the Chickesalunga creek.

ESTIMATE,

Commencing at the south bank of Swatara river near the ford road upon a level with the basin at the eastern end of the Pennsylvania canal (14 feet above the then surface of river) thence along the eastern margin of Susquehanna river and terminating near the mouth of Chickesalunga creek.

Item No. 1. From station No. 1 to No. 8, including $89\frac{24}{100}$ chains in length in some places gentle slopes, at others level; following nearly the direction of the Bainbridge road. Soil, clay, loam, gravel and detached stone.

Excavation on $89\frac{24}{100}$ chains area transverse	
sections $12\frac{9}{10}$ yds.—25,326 c. yds. 14 cts.	\$3,545 64
Culvert 4 feet diameter, do	300
Two road bridges, at \$400 each,	800
Grubbing slight,	75
	<hr/>
	4720 64

Item 2. From No. 9 to No. 12— $49\frac{18}{100}$ chains along Bainbridge road Soil clay, loam, gravel, and considerable detached stone.

Excavation, 49.18 chains x section 13.9 yds.	
15,070 cubic yards, at 18 cts,	\$2,712 60
Culvert 4 feet,	300
Grubbing,	90
	<hr/>
	3,102 60

Item 3. From No. 13 to No. 23=81.57 chains, part along road, then crossing a ravine to the foot of a steep sand stone hill (thinly wooded) extending to river and affording a sufficiency of earth for embankment. Here the canal must be reduced to 33 feet water line, with guard wall next the river.

Excavation on 65.96 chains x section $27\frac{1}{2}$ yds.	
3,960.62 cubic yards, at 22 cts,	\$8,779 32
Embankment on 15.61 chains = 10,380 c yds.	
at \$13 cts.	1,349 40
Dry wall on 54.88=11,455 perches at 75 cts,	8,613 82

Paving 2.77=264 sqr. yards at 46 cts,	121 47
Two culverts, one of 8 and one of 3 feet,	870
Grubbing,	80
Nine feet lockage, \$850 per foot lift,	7,650

\$27,464 01

Item 4. From No. 24 to No 27 = 37.44 chains along bottom land, between river and steep side hill. Soil clay, loam, gravel, with some detached stone.

Excavation on 37.44 chs. x section 18.4 yds.

15,155 cubic yards at 14 cts, 2,121 70

Grubbing, 28

\$2,149 70

Item 5. From No. 28 to No 32=36.83 chains, commencing with a steep wooded sandstone hill, sloping to river edge, and requiring a wall to support embankment for the greater part of the distance towards the end, only paving is requisite.—Canal modified as in item 3.

Excavation 21.05 chains x section 18.4 yards

=8521 cubic yards, at 20 cents, 1704 20

Embankment on 34.93=13,063 cubic yds. at 13 cts. 1698 19

Dry wall in 34.10 chains=919 perches, at 75 cts. 6894 75

Paving 2.73 chains, =280 square yds. at 46 cts. 128 80

Rock excavation 546.6 cubic yards at 62½ cents, 341 60

Culverts, 1 of 6 and 1 of 4 feet, 840

Waste Weir, 200

Grubbing, 30

11,837 54

Item 6. From No. 33 to No. 37=40.64 chains, generally the same steep sandstone hill, sloping into river—modified canal.

Excavation on 35.28 chains x section 19.4 yds 15,057

cubic yards, at 18 cents, 2710 20

Embankment on 10.78 chains=6806 cubic yds. at 13 884 77

Dry wall 29.44 chains, 8810 perches at 75 cts. 6607 70

Paving, 11.30 chains = 1361 square yards, at 46 cts. 580 06

Puddle lining, 16.66 chains=1748 square yds. at 6 cts. 104 88

Culvert 6 feet, 300

Grubbing, 241

\$ 11,211 67

Item 7. From No. 38 to 40=25.20 chains, at the commencement the line crosses Conewago creek at 117 feet of water way between the bridge and river. Towards the creek the side hill slopes diminish with hard sand stone upon the surface, but upon the south side of creek the formation changes to amphibolic rock. Earth can be easily obtained on side hill for embankment. Canal modified as before.

Aqueduct over Conewago, stone piers and abutments, with wooden superstructure,	3,400
Excavation on 21.40 chains \times section 14.5 yards = 6827 cubic yards, at 33 cents,	2252 91
Embankment on 12.93 chains=5205 cubic yds at 13 cts.	676 65
Dry wall for embankment on 12.47, 3220 perches at 60 cents,	1982
Paving 6.23 chains=731 square yards, at 46 cts.	336 26
Puddle lining and embankment 10.47 chains, 3233 cubic yards at 20 cents,	646 60
	<hr/>
	9244 42

Item 8. From No. 41 to No. 52=100.73 chains, the line passes through moderately wooded land, with gentle slopes between Hopkins' canal and steeper side hill to the left; the surface is in some places covered with detached stone. After passing the basin of Hopkins' saw mill, the line crosses the York Haven ferry road, and enters fine river bottom land. Near the commencement of this section a feeder must be taken from the river, and continue nearly parallel with the canal to its intersection with it at a point below the second lock, in this item, near York Haven ferry road. The expense of the feeder is not estimated, because the ground is rough through which it must pass and the cost of construction will depend upon its size and length of canal which it will have to supply—soil, clay, loam, gravel and loose stone.

Excavation on 100.73 chains \times section 14.5 yards 32,133 cubic yards, at 16 cts.	5141 28
Culverts, 1 of 8 and 1 of 6 feet,	870
Waste weir,	200
Road bridge,	400
Grubbing,	162
Locks, 1 of 8 and 1 of 9 feet lift, at \$850 per ft. lift,	14,450
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	21,223 28

Item 9. From No. 53 to No. 59, 78.52 chains river bottom land crossing Brubacker's run—soil, clay, loam.

Excavation 76.92 chains, \times section 16 yards=27,076 cubic yards, at 8 cents,	2166 08
Embanking 1.60 chains=356 cubic yards, at 13 cents,	46 28
Culvert, 10 feet span,	790
Four farm bridges, at \$200 each,	800
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	3,802 36

Item 10. From No. 60 to No. 65, 63.51 chains, part in flat land crossing a run, then rising to moderately sloping ground, and towards the end steep sandstone side hill—soil principally loam and gravel, with some sandstone and breccia.

Excavation on 62.51 ch. \times section 13 6 yds=18703

cubic yds at 12 cents,	\$2,244 36
Embankment on 1 chain 1054 yards at 13 cts,	134 42
Culverts, 2 of 10 feet,	1,350
Grubbing,	47
Lock 5 feet at \$850 per foot lift,	4,250

\$8,025 78

Item 11. From No. 66 to No. 70=64 $\frac{43}{100}$ ch. Some portions rather a steep sandstone hill, but there is generally a sufficient space with gentle slopes between the side hill and river for canal, which will require revetting with stone to protect the bank from abrasion. This section enters Bainbridge. Soil loam, gravel and coarse sandstone.

Excavation on 64 $\frac{43}{100}$ ch. \times section 22 $\frac{17}{100}$ yds 32176

cubic yards at 16 cents,	\$5,148 16
Embankment on 9 $\frac{79}{100}$ ch. 7755 c yds at 13 cts.	1,008 15
Paving on 64.43 ch. 8884 sq. yds at 46 cents,	4,086 60
Culverts, 1 of 8 and one of 4 feet,	700
Wasteweer,	200
Road bridge,	400
Grubbing,	36

\$11,578 91

Item 12. From No. 71 to No. 82, intersecting the south bank of Conoy creek 78.25 ch. The first 48 chains along the face of steep limestone rocks, projecting in places into the river, and at other places falling back sufficiently to allow an easy excavation upon gentle sloping side hill to form canal between hill and guard wall. The aqueduct will cross the creek below Haldeman's saw mill. Soil clay, loam, limestone rock. Part of canal modified as in item 3.

Excavation on 62.53 ch. section 16 $\frac{1}{2}$ yds 22698

cubic yards at 17 cents,	\$3,858 66
Embankment on 57.29 ch. 17384 c yds at 13 cts,	2,259 92
Rock excavation on 7.10 ch 2252 c yds at 62 $\frac{1}{2}$ c,	1,407 50
Dry wall on 48.29 ch 11706 perches at 75 cts,	8,779 50
Paving on 9.67=1126 sq. yds at 46 cts,	471 96
Puddle lining 7.28=1335 sq. yds at 6 cents,	80 10
Wasteweer,	200
Aqueduct over Conoy creek, wooden trunk,	1,600
Grubbing,	78
Farm bridges, 2 at \$200 each,	400

\$19,135 64

Item 13. From No. 83 to 89=54.63 ch. passing through Mr. Haldeman's garden on gentle sloping ground. Soil, clay, sand and gravel resting upon limestone at some depth; towards end of section and upon slope hill to left of line, marble upon surface: excavation easy.

Excavating 54.63 ch. \times section 16.8 yds = 20191

cubic yds at 10 cents,

\$2,019 10
600

Culverts 2 of 4 feet,

\$2,619 10

Item 14. From No. 90 to 98 = 80.9 ch along the lower edge of second river bank, upon level land through Brenneman's field, passing the Chesnut falls. Soil loam, and gravel; excavation easy.

Excavation 80.9 ch. \times sections 15.7 yds = 27663

cubic yds at 10 cts,

\$2766 30

Culvert,

300

Farm bridge,

200

Lockage 5 feet at \$850 per foot lift,

4,250

\$7,516 30

Item 15. From No. 99 to No. 103 = 16.46 ch passing along river bottom land to second bank. Soil clay, loam, gravel and some loose stone.

Excavating 46.46 ch \times section 14 yds = 14310 cubic yds at 12 cents,

\$1,717 20

One road and 1 farm bridge,

600

Grubbing, slight,

20

\$2,337 20

Item 16. From No. 104 to No. 111, to road leading to Venigars Ferry, is $82\frac{30}{100}$ chains. From second river bank sloping gently into even table land, crossing Groves' run above Huber's chopping mill and terminating at the Venigar ferry road. Soil clay, loam, gravel and some loose stone.

Excavating $82\frac{13}{100}$ chains \times section 13 yards, 23,-

538 cubic yards at 12 cts.

2,824 56

Grubbing upon side bank,

44

Three farm and one road bridge,

1,000

Culverts, one of 8 and one of 6 feet,

890

4,758 56

Item 17. From No. 112 to No 118 = $80\frac{1}{100}$ chains, leading near to the Marietta road, and crossing a run near Haldeman's distillery and Longenekers' house—soil clay, loam, gravel and loose stone.

Excavating $76\frac{5}{100}$ chains, \times section $10\frac{3}{10}$ yards,

18,906 cubic yards, at 13 cents.

2,457 78

Embankment on $9\frac{57}{100}$ = 1,657 cubic feet, at 13 cts.

215 41

Culvert, one of 6 feet,

400

3,073 19

Item 18. From No. 119 to 126, to the upper end of Marietta, $101\frac{39}{100}$ chains. The line keeps to the right of the public road, on gentle sloping ground, and terminates in an alley in Marietta, which forms the northern line of lots fronting upon River street: soil clay, loam, gravel and some stone.

Excavation on 101.19 chains = section, 10.2 yards	
= 22,707 cubic yards at 12 cents,	2,724 84
Two farm bridges,	400
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	3,124 84

Item 19 From No. 127 to No. 135—99.52 chains in an alley or street in Marietta, leading to Letiz's road below the town. The whole of this section consists principally of embankment, but earth can be obtained at a short distance.

Embankment on 99.52 chains 23,865 cubic yards at 20 cents,	4,773
Back drain along north line, 2,189 cubic yards at 6 cents,	131 34
Culvert one of 6 feet,	400
Bridges 6 at \$400 and 6 at \$200,	3,600
	<hr/> 8,904 34

Item 20 From No. 136 to No. 139=54.20 chains to a point near Columbia road and about 16 chains north west of a level picket, on head race leading from a dam near to bridge over Chicquesalunga creek—soil loam, gravel and some detached stone.

Excavation on 54.20 chains \times section 12 yards= 14,307 cubic yards, at 10 cents,	1,430 70
Grubbing,	56
One road and one farm bridge,	600
	<hr/> 2,086 70

SUMMARY.

Item 1	from south bank of Swatara, to end of No. 8	84,720 64
2	No. 9 to 12	3,102 60
3	13 to 23	27,464 01
4	24 to 27	2,149 70
5	28 to 32	11,537 54
6	33 to 37	11,211 67
7	38 to 40	9,244 42
8	41 to 52	21,223 28
9	53 to 59	3,802 86
10	60 to 65	8,025 78
11	66 to 70	11,578 91
12	71 to 82	19,135 64
13	83 to 89	2,619 10
14	90 to 98	7,516 30
15	99 to 103	2,537 20
16	104 to 111	4,758 56
17	112 to 118	3,073 19

Item 18	No. 119	to	No. 126	\$ 3,124 84
19	127	to	135	8,901 34
20	136	to	139	2,086 70

From station No. 1 to end of 139 is 16 miles and 64 chains,	\$167,916 78
Add for fencing 2,282 chains, at \$3.25 per chain,	7,416 50
“ contingencies 10 per cent]	16,791 67
Total amount,	\$192,124 95

It was my intention to have extended the examinations and canal survey, along the margin of the river to Turkey hill point, and thence along the face of the precipitous bluffs of that hill, to the mouth of Conestogo river, but in the operation of connecting our level picket, near the mouth of Chickesalunga creek, to a point in the dividing ridge at Kauffman's lane, betwixt the waters of little Conestogo creek and the former, with a view to ulterior surveys in conformity with my instructions, our whole party was attacked with sickness, and Mr. Truman who acted as topographical engineer, died. It was therefore late in the month of September, before we were enabled to take the field again, which left me but a very limited period to execute the further surveys and levels, directed in my instructions from the board.

All of which is respectfully submitted,

Signed JOHN WILSON,
Philadelphia, Dec. 14, 1827.

No. 9.

To the Board of Canal Commissioners of the state of Pennsylvania:

GENTLEMEN,

In conformity with the instructions of the board, directing me “to make an examination, survey and estimate, of a route for a rail-way from Philadelphia through Chester and Lancaster counties, so as to connect by the nearest and most eligible route, with the Eastern Division of the Pennsylvania canal,” I have the honor to present the following as a part of my report, upon the subject.

Dividing the whole route surveyed into two divisions, I shall consider the summit on Mine ridge, at Henderson's, as the point separating the eastern from the western, and proceed to describe, first, the various graduations of the western division.

Western Division.

Commencing at the level picket at the summit in the Gap of Mine ridge at Henderson's, which was formerly ascertained to be 588 feet above the tide waters of Schuylkill river, a level was carried from thence along the west face of the ridge, graduating the line as it progressed at the rate of 27½ feet to the mile, which was

considered as the maximum number in the various experimental lines which were traced in the course of this preliminary survey.

In the first reconnoissance the level was carried to a picket at Mr. Linville's which is $189\frac{1}{2}$ chains from the Gap, but finding at this point, that the ground on the south side of Loudon run would not be favorable towards the Pequea creek, which it was our object to cross, we returned to another picket nearly opposite Aby's barn, which was 129 chains from the Gap, and carried a line of levels towards the Lancaster turnpike road, which we crossed, and then continued the same to Williamstown, passing the latter place to the north, through Judge Lighter's property, and crossing Pequea at Frantz's mill pond, thence down the north bank of that stream to a bluff upon the creek, opposite to Mr. Whitmer's field, which presented a favorable position for crossing the stream with a bridge, and which was 19 feet below the Gap. From the latter point we crossed the stream, and graduated an ascending line $27\frac{1}{2}$ feet per mile, along the side slopes of Eshelman's run, to a picket east of the Black Horse tavern, on the Strasburg road, and thence to Linville's; but the ground over which this line passed, was both rough and circuitous, and exceedingly unfavorable for the formation of a road. An off-set level was also carried from the same line near Paradise, which extended across Eshelman's run, at his mill-pond, and was united with the Williamstown line. On this line, were it not for the expense of crossing Eshelman's pond, the ground would be favorable. Towards the fork of Brishborne's run at a level picket in M'Caslin's field, about a half mile north of the bluff at Whitmore's, another line of levels was extended up the Pequea, which crossed that creek below Hershey's mill, and from thence following the north branch of Huston's run, the line was finally united with the Gap summit. The exploration of these various lines, resulted in the opinion that the most favorable point on the Pequea to cross it with a road, was at Eckert's mill; from which to the Gap, we shall consider as the first section of the line.

Section 1, From the Gap to a point west of the Strasburg road and Aby's barn, the distance is 162 chains, cutting down the summit ridge 30 feet, the descending graduation will be 29.04 feet per mile, and from thence to Pequea, at Eckert's mill, 340 chains, and descending graduation $27\frac{1}{2}$ feet per mile. Bridge at Pequea, 28 feet high. There are three ravines on this section.

Section 2, From the bluff at Eckert's mill, to the level picket in M'Caslin's field, the distance is 125 chains, and line nearly level.

Section 3, From M'Caslin's through the farms of John King and Pederkein to the lane leading to Weaver's house, the distance is 136 chains, and the rate of graduation per mile is 7.36 feet ascending. Leaving Weaver's house to the north, the line of road will pass over favorable ground, through the farms of Mr. Porter and Abram Reese, then following a north west direction, and crossing the old Lancaster road, a short distance west of the Bird-in-hand tavern, it goes through the orchard of J. Conrad, and strikes Mill creek at the breast of the dam of Daniel's mill-pond.

Section 4, The distance from Weaver's lane to this point, is 284 chains, and rate 13.84 feet descending. The position here is exceedingly favorable for a bridge. On both sides the limestone is upon the surface, but the bluff upon the west side at Gibbin's is more precipitous than that upon the east; the height of the bridge here will be 32 feet, and its length of platform 50 feet. Leaving the Mill creek at Samuel Gibbon's bluff, the line is traced along the south side of the ravine leading to Jesse Guilbert's farm; from thence to the Smoketown road, which is the summit of the ridge dividing the waters of Mill creek from the Conestoga river.

Section 5. The distance of this is 84 chains, and by cutting the summit at Guilbert's 9. 8 feet, the ascending graduation will be 13.08 feet per mile, graduating from this summit an easy descent along the head branches of Landis' run, through the lands of Kirk, Hare, Buckwalter and Landis, intersecting the Horse-Shoe road. The section terminates at the distance of 186 chains in a lane, between Landis' and Beckerman's houses, and descends at the rate of 7.18 feet per mile.

Section 6, The graduation of the next section to the point from whence we must cross Conestoga river, is at one maximum rate. If from the summit near Guilbert's, the line had taken the north side of Landis' run, a much less expensive bridge across the Conestoga would have been obtained at the Bluff above the junction of that run with the river. But the continuation of the line westward from the Conestoga would have passed over the ridge, dividing the western Landis' run from Brubacker's about 3 miles north of Lancaster, increasing the distance of the road and rendering the descending graduation towards Little Conestoga, beyond the limits of this survey. Returning to our level pickets in the lane near Beckerman's, the line winds to avoid inequalities of ground through Landis' woods, and perforating a ridge of 8 or 9 feet high and 10 chains base, keeping the gentle sloping ground as far as Demuth's mill, it then follows the summit of the ridge, south of J. Landis' house and reaches a point nearly opposite to the precipitous bluff at Mr. Hall's mansion.

Section 7, From this point the bridge will keep the descending ridge for 840 feet, with a mean height of $12\frac{1}{2}$ feet and thence crossing the stream to the opposite rocky bluff, in the distance of 534 feet, with a height of $49\frac{1}{2}$ feet. The distance of this last section is 146 chains to the commencement of the bridge, and the descending graduation $27\frac{1}{2}$ feet per mile.

Section 8, From the Conestoga bridge the line is traced along the gentle sloping ground of Hardwick's run, passes south of Mr. Hall's residence, crosses the New Holland turnpike to the north of E. Colman's and enters the north east corner of the city of Lancaster, thence it crosses the Reading road at Stambach's, and terminates in a lane leading to D. Mayer's house, the summit of the ridge between Hardwick's and Swar's runs, this must be cut down 794 feet, and the ascending graduation will then be 21.12 feet per mile and the length of the section 136 chains, thence following nearly

the direction of the lane through the farms of M. and D. Mayer's, and passing the residence of S. Sheffer on the Manheim road which we leave upon our right, we reach our level picket in a lane near the residence of J. Sharp. The length of this section is 123 chains, and the rise only $\frac{87}{100}$ feet or nearly level.

Section 9, From the summit on the Mine ridge to the level picket at Sharp's, with the exception of 3 or 4 ravines, the others that the line crossed were of moderate breadth and depth.

Section 10, Continuing the level from Sharp's and crossing the head of Brubacker's run, the line was then traced along the gentle slope bank of that run to a favorable point on a bluff of Little Conestoga creek above Kinsley's oil mill, where the creek is crossed with a bridge 402 feet in length and 24 in height. The distance from Sharp's to the bridge is 145 chains and the descent at 8.4 feet per mile. Considering it expedient to examine two routes from Lancaster to the Susquehanna, and as the limited time for this survey would not permit us to survey both with the instruments then in use, after obtaining an additional one and organizing another party, I proceeded with the level myself and traced a route in the direction of Columbia. At the same time Mr. Haines continued the line from the west bank of the Little Conestoga creek, along the north edge of Kauffman's run, towards Mount Joy, and thence to the Susquehanna, a general description of which, taken from the level book will be given in the sequel of this report.

At the termination of the second station from Little Conestoga to the Mount Joy route, the level was carried across Kauffman's run and Harrisburg turnpike, to the east of the Buck tavern on sloping ground to a point opposite Reigart's mill, and from which the ground is favorable to cross the Little Conestoga creek, north of Swar's run, continuing on the north margin of Swar's the line is united with our level picket in the lane at Sharp's.

Section 11, The height of the bluff upon the west side of the creek, was considered sufficiently high for a 27 feet bridge, and the distance from the level picket at Sharp's to the creek is 120 chains (estimated by protraction) and the graduated descent 18.16 feet per mile, and to the picket west of Reigart's mill the distance is 80 chains, (estimated by protraction) and the ascent 27.35.

By crossing the Conestoga opposite Reigart's mill, several ravines at the head of Brubaker's run, are avoided, which would require heavy embankment. Upon a future examination, it would be advisable to cross the creek below Swar's in the direction of Hempfield, and if found practicable, the line of rail way to the river, would then be shorter than the distance by the turnpike to Columbia.

Sec. 12. Returning to our level picket at the termination of the last section, the line pursues a southernly course through Jacob Mayer's farm, then east of Hempfield crossing the Marietta turnpike, then west crossing a narrow branch at Jonathan Leaman's, and terminating the section in Habacker's field.

Section 13, At Jacob Mayer's there will be some embankment, and north of that a small cut in a narrow ridge—The ascending graduation per mile in this section, is 16.08 feet and the distance 213 chains.

Section 14, From Habacher's the line crosses the Columbia turnpike, near Peltz's tavern, and runs westwardly to a ridge north of Senner's house. The distance is 98 chains, and the ascending graduation per mile is 18 feet. The ridge north of Senner's must be cut 13 feet at a base of 30 chains.

Section 15, Leaving the ridge at Senners, the level is carried a short distance north of Kauffman's house, then it passes over gentle sideling ground, and after crossing Hershey's mill pond at the breast of the dam, the section terminates north of his house; the distance is $66\frac{1}{2}$ chains and the ascending rate per mile is 5.19 feet; on this section the bridge at Hershey's is about 38 feet high and 294 in length.

Section 16, From the level picket at Hershey's, the line is traced over favourable ground to a ridge in Jacob Seitz's woods, dividing the waters of the west branch of little Conestoga from Stricklers' run; distance $88\frac{1}{2}$ chains, and ascending graduation 16.16 feet to the mile—This summit must be cut 7.59 feet.

Section 17, From Seitz's the line descends along gentle sideling ground for 89 chains, at the rate of 13.78 feet per mile and this section terminates at a point south of Backman's mill, and about 16 or 17 chains east of Millinger's ravine. The level from this point was carried along the face of the side hill to the termination at the river, a few yards below Strickler's mill.

Section 18, It is proposed to place near the position east of Millinger's ravine, a stationary steam engine and to descend 130 feet by an inclined plane to the meadow of Strickler's run, from thence to the river bank, the distance is 150 chains, and descending gradually 18 feet per mile along its margin to Columbia the ascent is very gradual.

The whole line from Lancaster to Columbia, presents fewer difficulties in its course than any other portion of the same extent, from the Susquehanna to Philadelphia. From Columbia it is proposed to extend the line along the margin of the river, passing through Marietta to Bainbridge, and terminating it at Hopkins dam 4 miles below Swatara. On this route excepting about $\frac{1}{4}$ ths of a mile around the base of Chickey's rock and the same extent between the mouth of Conoy creek and Bainbridge, the ground is exceedingly favorable.

Section 19, The graduation can be regulated at a rate not exceeding $3\frac{1}{2}$ feet per mile, and the bridge across Conoy and Chicksalunga creeks, will not together amount to more than 160 feet in extent. The distance from Strickler's to Hopkins $15\frac{1}{2}$ miles, should it be deemed necessary to avoid a fixed steam engine at Millerger's, another line may be explored to the north of Columbia. The ground over which it will pass appears favorable. In descending the river from the mouth of Chicksalunga creek by raising

very gradually along the base of the above mentioned rock until it is cleared, then continuing along the foot of the slope of Chesnut ridge you gain a ravine, the summit of which immediately north of Mount Pleasant village. Cutting through this ridge and continuing the line along another ravine, it finally unites with the level picket, in Habaker's field.

I now proceed to state generally the character of the ground, on the above line explored by Mr. Haines towards Mount Joy, and thence to Hopkin's dam on Susquehanna river, as taken from his level book. From the level picket on the west bank of little Conestoga creek, above Kinsley's oil mill, along the north margin of Kauffman's run to the summit near Kauffman's lane, which divides the waters of little Conestoga and Chickesalunga creeks, the distance is 4 miles 27 chains. By reducing this summit 12 feet at a base of 30 chains the ascending graduation per mile 16.10 feet. The line on this section passes over several small runs and some considerable ravines.

From the summit at Kauffman's to the east bank of big Chickesalunga creek, following the north margin of Hershey's run and Muddy creek, the distance is 2 miles 34 chains and descending graduation 16.25 feet per mile: this section is rough. Bridge across Chickesalunga 48.45 feet high above Greider's mill.

The next section ascends to the ridge dividing the waters of big and little Chickesalunga creeks. reducing the summit 12 feet at a base of 25 chains. The graduation will be 10.82 feet per mile, and distance 1 mile 12 chains.

Descending from the latter summit to little Chickesalunga creek near Neissley's ford, the creek is crossed with a bridge 52 $\frac{1}{4}$ feet high. The length of the section is 54.4 chains and graduated descent 15.40 per mile.

From the west bank of little Chickesalunga to the summit of the ridge dividing from Share's run, the distance is 1 mile 20 chains, and reducing the ridge 8 feet at a base of 15 chains the graduated ascent will be 15.71 feet, per mile.

Thence to Share's run above Zook's spring the distance is 57.7 chains, and the descending graduation 12.97 feet per mile—Share's run will require a bridge.

From Share's run the ground rises for 1 mile 10 chains, and the rate per mile of graduation 13.83 feet; crosses 2 ravines. Thence ascending 1 mile 23 chains and crossing two ravines, the graduation is 13.4 feet per mile.

Continuing still to rise for 1 mile and a half chain, the graduation for this section is 16.61 feet per mile, and it crosses one ravine.

From the termination of the last section the line descends to the east bank of Conoy creek, and the distance is 1 mile 77 chains; the descending graduation per mile is 14.13 feet. To straighten the line of this section, it is necessary to cut 10 feet for 10 chains. Bridge at Conoy creek 30.44 feet in height—length about 700 feet.

Keeping along the face of the ridge of Conoy valley and running nearly parallel with the creek for 70 chains, the line descends 2.82 feet—but for a very deep ravine on this section, the line might have been kept up in order to diminish the deep cutting in the next section.

From the termination of the latter section, following the face of the same ridge towards Bainbridge, the line afterwards runs parallel with the river $\frac{1}{4}$ th of a mile from it and terminates at the lower end of Hopkin's canal, about a mile below its entrance from the river. The distance is 4 miles 36 chains, and descending graduation 23 feet per mile—The length of deep cutting on this section is 96 chains and 25 feet in depth.

In closing the preliminary descriptions of and observations on the western division of the Schuylkill and Susquehanna railway, I shall reserve the more particular remarks and views upon the subject to accompany the proposed method for the formation of the road and the estimate of its expense.

I now return to the summit of the main ridge at Henderson's, and proceed with the description of the eastern division of the line.

Sec. 20, Reducing the summit at the gap by a cut of 30 feet and at a base of about 30 chains, the line is graduated on the eastern margin of one of the branches of Octoraro creek and passes south of Mr. Moore's residence; then winding gradually along the gentle sloping margin of the meadow, it enters the lands of Messrs. Walker and Coates, thence crossing the Newport turnpike and following the same edge of meadow, it passes through the farms of the estates of Dickerson and Moore, and terminates at a favourable bluff for crossing the middle branch of Octoraro, above Morris' mill pond—The length of this section is 235 chains, and the graduation descending 20.32 feet per mile. Bridge across Octoraro 400 feet in length and 25 in height.

Section 21, From Moore's the line continues along the face of the slope bank of the mill pond, and then enters upon gentle side-lining ground of the great Chester valley, keeping north of the valley it terminates in a bluff, below the dam of Cloud's mill pond, on the eastern branch of Octoraro creek. The distance from Moore's to Clouds is 150 chains and the rate per mile of ascending graduation is 14 feet—bridge across Octoraro 18 feet high, length of bottom 314 feet.

Section 22, Leaving Cloud's mill the line keeps the southern slope of the north valley hill, crossing in its course some small ravines, and after intersecting the valley road, it curves southwardly to avoid deep cutting, to a middle point in the summit ridge at Smith's, between Octoraro and Buck run. The length of this line is $231\frac{1}{2}$ chains, and the graduated rise per mile is 7.92 feet; Octoraro summit is lessened by a cut of 10.23 feet.

Section 23, As we leave the last mentioned ridge, the line returns towards the sloping face of north valley hill, crosses a branch of Buck run and Strasburg road at Park's tavern, and Buck run

east of David Truman's it still continues over favourable ground to the ridge between the waters of Buck run and west Brandywine, where the section terminates. The distance between the two summits is $242\frac{2}{3}$ chains, and the graduation per mile descending is 23.04 feet.—The latter summit must be cut 30.38 feet at a base of 23 chains; the bridge over Buck run will be small.

Section 24. From the Buck run summit to west Brandywine at Coatsville, on the south face of the north valley hill, the ground generally has a gentle declination to the valley, the line crosses several narrow branches or spring runs. It intersects the Lancaster turnpike near Coatesville, and after leaving this road the side hill as the Brandywine is approached, becomes steep. The length of this section is 257 chains and the graduated descent is $27\frac{1}{2}$ feet per mile. The bridge across the Brandywine by this graduation, will be 70 feet high and 640 long, by cutting the ridge near Buck run 10 feet more, it will reduce the graduation to 24.6 feet per mile, and bridge to 60 feet in height.

Section 25. From west Brandywine still continuing along the same face of the valley hill, the section ends near Gardiner's house at a ridge dividing the waters of west Brandywine from those of east Brandywine, cutting the ridge here 3.55 feet, the line will be level and its length $150\frac{1}{2}$ chains. Should it be expedient however to lessen the height of west Brandywine bridge 10 feet, and to cut the ridge 8.55 the ascending graduation per mile to Gardiner's, would be 2.64 per mile.

Section 26. Extending the graduated line along the base of North Valley hill, it crosses Beaver creek near Mr. Downing's, which will require a small bridge and embankments; and continuing east intersects another branch, and the Harrisburg turnpike.—The section terminates on the face of the slope bank of East Brandywine, nearly a mile above Downingstown, and the river is passed with a bridge of 40 feet high and about 910 feet long. Extent of the section 467 chains and rate of graduation per mile 16 feet descending.

Section 27. From East Brandywine to our level picket near Trimble's saw mill, on the principal branch of East Valley creek, the ground still continues favorable for a road. The stream must be crossed with a small bridge. The length of this section is $361\frac{2}{3}$ chains and the line ascends at a graduation of 12.34 per mile.

Section 28. Continuing from our level picket to the levels, the summit of the ridge dividing the waters of the eastern and western Valley creeks, which is near the White Horse tavern the line passes over favorable ground and the section terminates to the east of the old Lancaster road. The length is $26\frac{1}{2}$ chains and the ascending graduation 10.32 feet per mile.

Section 29. From the summit near the White Horse tavern, the line crosses the valley in a southern direction towards Kennard's school house, it then continues on the north side of the Lancaster and Philadelphia turnpike and terminates on a ridge near the Chester

academy. This ridge must be cut down 15 feet. Length of section 93½ chains and ascending graduation 23.20 feet.

Section 30. From this ridge the line crosses the turnpike and keeps to the south of it, along the face of the South Valley hill to a level picket near the Warren tavern. The length of this section, is 199 chains and ascending graduation 7.68 feet per mile.

Section 31. Continuing along the face of the same hill, the line intersects the turnpike near the toll-gate, immediately above the Warren tavern, crossing in its course, several very deep and wide ravines and terminates at a point a short distance north of general Evan's tavern, Paoli. Length of section, 219 chains and graduated rate per mile ascending 26.64 feet. I will here remark that great difficulties presented themselves in exploring and finding a favorable route for leaving the Chester valley.

In order to facilitate the operations, I proceeded in advance of the levelling party with a line of levels as far as the ravine which enters the valley at Howell's (Davis's) tavern. In running the line to the head of the defile, the ground rose too rapidly to admit of a passage through it. The levels however, were extended along the ridge to the north of the Philadelphia turnpike, as far as a summit (dividing the waters of Schuylkill from Delaware) in Mr. Grove's field, a short distance north of the Spread-Eagle tavern, which was ascertained to be nearly 62 feet above the level at the White Horse. Mr. Haine's after passing with the levels the ridge near the Chester academy (stated in section No. 29) kept with an elevated level to the end of the section No. 31 at Paoli, and from thence he crossed the ridge on the turnpike about one and a half miles east of the Paoli tavern and carried the line towards the summit at Grove's.—His report upon the section from the Warren to the Spread Eagle, was so favorable that the line was continued to the Schuylkill without further examinations being made upon it. I find however from the profile and draft made out from the level book, that that portion of the line passed over more uneven ground than any other section between the Schuylkill and Susquehanna rivers. The ravines crossed are numerous and several of them of great depth. A further examination will be made of it previous to the completion of the estimate.

Section 32. Returning to the level picket at Paoli and continuing the line on north side of South Valley ridge, it terminates on a summit in Mr. Vanleers orchard, near the toll-gate. The distance is 200 chains and by reducing the summit 15 feet at a base of 18 chains, the graduation of the section will be 5.64 feet per mile.—Three ravines are crossed and a ridge of 10 chains must be cut 20 feet.

Section 33. From Vanleer's the line crosses the turnpike and re-crosses it near the Lamb tavern, it then keeps north of it and passes through Mr. Grover's, near the Spread Eagle tavern. From thence it is traced on favorable ground, to the east bank of the ravine, which it crosses north of Benjamin Mould's house. The length of this section is 335 chains and descends upon a graduation

of 27½ feet per mile. Bridge across Mould's ravine, 34.13 feet in height and 600 long.

Section 34. Leaving Moulds ravine the line passes through lands of L. George and G. Curwin, north of the turnpike and reaches a summit on Rudolph's land, reducing which 20 feet the ascending graduation will be 9.97 feet per mile and the distance 174 chains.

Section 35. From Rudolph's summit the line crosses the turnpike west of the house of William Thomas, and passes south of the Buck tavern, near which it re-crosses the turnpike and taking a direction towards Dr. Anderson's, it meets the old Lancaster road and following nearly its course, the section terminates this line at the line point where the Flat Rock bridge road leaves the old Lancaster near Henry Browman's. The length of is 602 chains and the descending graduation is 15.48 feet per mile. The line crosses five ravines of about four chains wide each, and 20 feet deep.

Levels from section No. 35, were carried along the ridge north of the turnpike to the Schuylkill river, with a view to a knowledge of the country but as it is a matter of some consideration to determine whether the river shall be crossed and if so, the most advantageous point for crossing by a bridge, the line has been left open from this section for future decision.

Having only completed the survey on the 29th of November, the time remaining has been too limited to afford me an opportunity of putting together the extensive notes made during the examinations through the country, so as to form a correct estimate of expenses of all the constituent parts of the rail way.

From the nature of the subject and the varied surface over which the survey has passed, it must be obvious, that a careful and minute calculation is indispensibly necessary to the attainment of a correct estimate I shall however, exert myself to prepare within as short a period as possible, the remaining part of this report.

All which is respectfully submitted.

Signed

JOHN WILSON.

Philadelphia, Dec. 17, 1827.

No. 10.

Extract from the Report of the Commissioners of the Susquehanna canal, made to the General Assembly of Maryland, on the 23d of November, 1826.

On casting our eyes along the rocky and broken hill sides of the right bank of the river, for a short distance below Conewago falls, we, for some time flattered ourselves, that the canal might, perhaps, be more advantageously carried down on the left bank of the river, and brought over somewhere near or below M'Call's ferry, on an aqueduct, whence it might proceed over the country to Baltimore. But we had not proceeded far in this exploration before we found that nothing was to be gained by it, and it was therefore, abandoned. For it is very remarkable, that every where

below the mouth of Chickaselunga creek, the rugged, rocky and unmanageable nature of the shore is much worse on the left, than on the right bank of the river. At Chickaselunga on the right bank, there is much steep and broken rock, and a short point of a perpendicular mass to encounter; but on the opposite side, there is a long space of highly elevated, solid rock, rising perpendicularly from out of the rapid current of the river itself. Below Columbia the channel of the river passes along near the left bank; and from Turkey hill rushes down with the speed of a torrent, for a considerable distance, at the foot of a solid mass of high perpendicular rock; but on the right shore, the hill sides are steep, rocky and broken, but manageable. The relative character of the two sides of the river is the same the whole way to Havre-de-Grace. *Upon the whole, therefore, we feel satisfied that there can be found no other practicable route for a canal from the head of Conewago falls to tide, than that which we have surveyed along the right margin of the river.*

Extract of a Report to the Commissioners of the Susquehanna Canal on the survey of a canal line, along the west side of the Susquehanna river, from Conewago falls to the head of tide water, by James Geddes, Esq. Engineer, November 7th, 1823.

In following the valley of the Susquehanna, much of the whole distance from the mouth of Codorus to tide, may be pronounced very difficult to conduct a canal along; although there are neither *deep cuttings* nor *high embankments*. The difficulties are, that upon any level or levels that may be taken, the line of the canal will run so great a proportion of the way on the slope (and generally a very steep slope too) of a mountain, composed to all appearance almost entirely of rocks; and still worse the earth to line it in much of the distance, cannot be obtained but with great difficulty. The nearest earth lies generally on the top of these rocky eminences, two or three hundred feet, and often more, above the level of the canal line. A case is presented here, which never occurred on the New York canals; to wit: the great expense of getting earth for lining the canal. The cost of bringing earth down the face of such high, rough, and steep mountains, would in many situations, probably exceed the cost of carting it a mile along the level bottom of the canal. From a short distance below the mouth of Codorus, to near Marietta, would be the longest stretch on which little or no earth would be found on the canal line. The most difficult place to obtain it would be along the high promontary over against Marietta, to a point opposite the mouth of Chickey's creek.

Few mountains which are, to appearance, composed entirely of rocks, have such a covering of timber as those forming the western bank of the Susquehanna; so that persons passing swiftly down on arks or rafts, may be readily led to suppose those timbered steeps not very unfavorable to the conducting a canal along their faces. But, to the *formation*, consisting of scarce any thing else than rocks, must be added the consideration of the *steepness* of the slope, very

often exceeding forty-five degrees, and seldom under the angle given to canal banks, requiring the supporting with *masonry*, the lower side of the canal, in almost every place, where it would run along the face of these rocky mountains.

The rocks composing the sides, which face towards the river, of these mountains, are generally large loose masses, lying in the most irregular manner, as if "dropt in nature's careless haste." A canal would be constructed, in such a place, by forming an excavation or trough to contain the water: First, of these great loose stones supported by a rude *dry wall* on the lower side, over the bottom and up both sides, then faced with pounded stones, made finer than on a good turnpike road; next coated with the best gravel, coarse at first, but very fine on the surface. It is now prepared for the last lining of earth, which would vary in the thickness, as it might happen to be porous or water-tight stuff. Water to give this earth a partial puddling, would in most places be collected from little streams out of the hills, and, in some places would have to be pumped from the river below. These mica, or talcose rocks, which compose these mountains, would be easily pounded, and might be brought down to a fine gravel with less expense perhaps, than gravel could be procured otherwise, in many of the situations.

A canal, thus made, would not only be exposed to evaporation from the surface of the water, but the air would pass among the large loose stones, under it, and on both sides of it, carrying away the ooze, which in a common canal, are received into the rain-soaked earth. The loss sustained from *soakage* and *evaporation*, on such a canal, would surely be great, although the work should be done in the most faithful manner; but the many streams which enter the west side of the river, would probably be sufficient to supply the great waste of water to which such a canal would be exposed, without resorting to any expedients for drawing water from the river. The most doubtful place would be above the mouth of Muddy creek.

From calculations of the expense of moving these rocks, building rude walls, pounding stones, bringing earth from a distance for lining, puddling, &c. it results that some portions of the proposed canal will cost, (excavation and lining complete for the reception of the water) at the rate of \$80,000 per mile. An approximation towards the cost of a canal, from above York Haven to near Havre-de-grace, is attempted by dividing the whole distance, into portions of like kind; portions which will cost about, at the same rate, per mile, and affixing the valuation to each portion. The several portions are shewn, on the map of the river, by numbers corresponding with the following:

From ninety chains above York Haven to near Havre-de-grace.

	chains.	dolls.
1. Place of beginning		
2. Level rocky grounds, widening and deepening an old canal	90	6,000

	chains.	dols.
3. Steep and rocky, but the hill not high, sand stone fit for culverts	100	19,360
4. A gentle slope, and in places, bottom land	70	3,500
5. Rocks to the water edge, steep but not high, and at 5 chains a mass of pudding stone	63	6,498
6. The like rocky shore, but limestone	66	6,098
7. Pretty favorable ground, some rocky spots	152	8,356
8. A stony flat at the bottom of a high rocky hill	20	1,452
9. A rocky mountain to the water edge, angle of the slope 30°	188	117,500
10. A gentle slope and good earth	47	2,274
11. Steep and rocky hill; last half mile a narrow flat and earth	85	38,000
12. A space between the mountain and river, wide enough, but little earth	52	13,000
13. Precipitous rocks to the water's edge	20	15,000
14. Space for a canal, but little earth	50	12,500
15. A rocky promontory to the edge of the water	16	12,000
16. Little difficulty presents in this distance	197	11,000
17. Generally near 30 feet between the river and mountain	53	13,000
18. An average of from 10 to 15 feet of flat; mountain high and rocky	84	40,000
19. Space between the river and mountain just wide enough	244	11,000
20. A rocky hill to the water's edge	23	15,000
21. Generally room enough between the mountain and the river	74	8,000
22. Rocks to the water's edge	27	15,000
23. Generally room enough between the mountain and the river	62	4,500
24. A rocky hill to the river's edge, and not very steep	102	57,375
25. A space of 10, 20 and 30 feet between the mountain and the river	124	60,000
26. Very rocky mountain to the water's edge	83	60,000
27. River flat at the foot of a steep stony hill	82	10,000
28. A narrow flat at the foot of a rocky steep	20	8,000
29. Very feasible throughout this distance	29	1,430
30. Loose, large rocks, but not steep near the river	43	3,000
31. Level, low bottom, joining a cultivated hill	91	5,600
32. Pretty steep and rocky	28	14,000
33. A rocky steep mountain to the water's edge	28	17,500
34. A mass of high rocks, very large	42	35,000
35. Good ground, except some peat rocks	131	8,000
36. A gentle slope from the mountain to river, but quite rocky	39	2,904

Chains. Dollars.

37. Pretty feasible; cultivated ground most of the way	120	5,808
38. Good level land, wide enough between the mountain and river	64	2,904
39. Very rocky and steep to the water's edge	42	30,000
40. Broad flat; not alluvial; some loose rocks	73	6,000
41. Very steep rocky mountain to river's edge	42	30,000
42. Cornfield on a slope, some part meadow flats	57	9,100
43. Mouth of Peach-bottom, cr. 44; bottom not too low. 72 chains x 59=	131	
44. A road, but 15 feet wide at the foot of a high, steep, and rocky mountain	45	
45. Room and earth sufficient	33	1,600
46. Granite—road but 15 feet wide between the mountain and river	14	10,500
47. space just wide enough, and sufficient earth	20	1,000
48. Space of 10 or 15 feet between the mountain and the river	12	6,000
49. Mountain's foot to river's edge	17	12,800
50. Average 15 feet between the mountain and the river	15	7,500
51. Steep and rocky into the water	5	3,700
52. Pretty feasible	55	2,660
53. A rocky mountain hanging over deep water	24	24,000
54. Cleared land up a steep hill	15	730
55. All steep rocky shore	35	26,000
56. Flats of broad valley; surface above the floods	31	1,500
57. Very rocky hill to the water's edge, but not very steep	21	12,500
58. Some of the best	90	4,376
59. Large rocks, but the mountain not steep	51	25,500
60. Rocky mountains down to the very shore	29	22,500
61. Wide flats nearly all the distance	154	9,317
62. Stony hill to the water, but not steep	37	15,000
63. High, rocky, granite hill; steep near the river	98	73,500
64. Very good, except the crossing Deer creek	140	6,776
65. Rock shore, but not steep	27	11,000
Excavation of the whole distance, 55 miles 62 ch.		\$1,256,188
Conewago dam and 5 aqueducts		10,600
Lock opposite Columbia for a communication between the river and canal		10,000
Guard locks and feeders		25,000
Culverts 61, at \$200 each		12,200
Waste weirs 50 of 50 feet each \$200		10,000
Bridges 50 at \$80 each		4,000
Fencing where there are no walls or precipices		21,500
Lockage for 272 feet		272,000
Sum total on the river		\$1,622,488

To the Canal Commissioners of the state of Pennsylvania.

GENTLEMEN:

I have just completed an examination of a proposed canal route on the east side of the Susquehanna river, between Chickies creek and the Maryland line. My instructions from Mr. McIlvaine were to commence at the point where Major Wilson terminated his rail road examinations on said creek, and to continue my examinations and levels along the margin of the river, with a view to an estimate of the probable expense of said route.

In pursuance of these instructions, I commenced at the above mentioned point, and run down as far as Turkey hill a distance of $8\frac{1}{2}$ miles. There we found the rocks so steep, and so high, and the the river so deep, and so rapid, that we were obliged to abandon the idea of continuing the level any further. Nearly the whole of the remaining distance to the Maryland line, the shore of the river presents the most serious difficulties. In many places the rocks rise two or three hundred feet above the surface of the river, and at most of these, we were informed that the water was from 50 to 60 feet deep. In order to get along, we were obliged to employ a guide to conduct us through the passes of the rocks, through which we forced our way frequently at the risk of our lives.

Had the river been lower or less rapid, we could have succeeded better with a boat, but at this time the current was so strong that a landing could only be effected at a few places, and we were therefore compelled to keep on the shore.

In measuring the distance we kept along the shore as much as possible, but when that was impracticable the chain was carried on the table land above.

Under all the circumstances, I cannot pretend to give a very accurate estimate. That would indeed be a very difficult task under any circumstances and could only be effected by a very patient and nice examination. I submit the following however, with the belief that it will not vary much, and hope it will answer the purpose for which it was intended.

1st distance	20 chains:	will cost,	
2 do	99 do	do	\$4,030
3 do	487 do	do	64,565
4 do	72 do	do	52,612
5 do	48 do	do	54,460
6 do	80.40	do	6,000
7 do	195 do	do	11,000
8 do	78 do	do	146,250
9 do	23 do	do	11,700
10 do	98 do	do	19,500
11 do	98 do	do	14,700
12 do	103 do	do	75,120
13 do	63 do	do	9,450
14 do	35 do	do	27,300

14th distance.	10 chains.	will cost.	
15 do	40 do	do	\$7,060
16 do	24 do	do	40,000
17 do	59 do	do	13,450
18 do	108 do	do	58,120
19 do	20 do	do	16,200
20 do	80 do	do	16,250
21 do	32 do	do	21,300
22 do	33.5 do	do	21,500
23 do	27 do	do	4,950
24 do	4 do	do	21,938
25 do	17 do	do	750
26 do	15 do	do	14,880
27 do	15 do	do	2,812
28 do	30 do	do	1,500
29 do	90 do	do	4,500
30 do	34 do	do	6,750
31 do	56 do	do	5,950
32 do	202.30	do	56,000
33 do	5 do	do	35,450
34 do	14 do	do	4,052
35 do	12 do	do	2,100
36 do	2 do	do	9,370
37 do	5 do	do	300
38 do	195 do	do	3,750
39 do	13 do	do	29,254
40 do	30 do	do	9,778
41 do	80 do	do	4,500
42 do	57 do	do	7,500
43 do	3 do	do	8,550
44 do	5 do	do	1,875
45 do	1 do	do	750
46 do	3 do	do	750
47 do	4.39	do	451
48 do	1.41	do	2,250

1,029.50

\$831,432

The descent of the river according to Mr. Poppleton's map, from Columbia to the Maryland line is 163.75 feet. The descent from Chickies to Columbia is 11 feet, making the whole descent from Chickies creek to the Maryland line 174.75 feet, which constitutes the amount of lockage on this route. This at \$150 per foot lift the price of wooden lock amounts to

\$26,212.50

957,644.50

Add ten per cent,

95,764.45

\$1,053,408.95

Respectfully submitted,

CHARLES T. WHIPPO,

Engineer.

Harrisburg Dec. 25, 1817.

To the Canal Commissioners of the state of Pennsylvania.

GENTLEMEN—

The intelligence of my appointment last spring, did not reach me till late in June, and being obliged to proceed to Philadelphia to receive my instructions, I did not arrive at the scene of my operations till about the middle of July following. I had then to make the necessary arrangements for the season, which took up several days, so that I was not fully prepared to commence business till the nineteenth. My company consisted of persons wholly unacquainted with the business of engineering. They were to be organized and disciplined, and our progress for a time was consequently slow.

The first duty assigned me was the survey of the proposed canal route between the Allegheny river and lake Erie by way of the Ohio, the Beaver and Shenango. The second was to make examinations across the dividing ridge betwixt the head of the Feeder at Meadville, by way of French creek and what is called Beaver dam summit, to the bay of Presque Isle. And the third to go on to the summits which have been explored this season, by Messrs. William Wilson and John Mitchell. The one lying betwixt the Sandy-Lick and Bennett's branch of the Sinnemahoning; and the other betwixt the Cushing and the Two Lick of the Conemaugh: and with these gentlemen to examine these routes and to collect such information as would enable me to decide, whether, by either of them a water communication, capable of admitting an active navigation, was practicable. These several duties have been performed, and I will now proceed with their detail.

I propose to divide the routes which I have explored, into natural sections, varying in length according to the character of the ground over which the location has been made, and give the description and estimate of each separately, as I go along.

Section 1. Equal 96 chains.

I commenced operations on the west bank of the Allegheny river, opposite to Pittsburg, at the scite of the out-let lock of the western division, of the Pennsylvania canal, and adopted such an elevation above the bed of the river, as that the canal might be secure from its floods. Thence we carried our level downwards, along the bottoms of the river, at the foot of the hill at our right, and at such a distance from it, as to give sufficient space for the canal. By so doing, we found the general surface of the ground a little below bottom, which at this place will increase expense, but it has an opposite effect beyond where we rise unavoidably, into deep cutting. This difficulty will be further compensated, by the circumstance, that the towing path bank here will only be required, the hill serving for the other side of the canal. Earth can be had very convenient for embankment. Upon this section the canal will be deep, and it may also be made wide, which I would al-

ways recommend, when as in this case, it can be done without materially increasing the expense. My reasons are, that the deeper and wider our canals, to a certain extent, the more easily and rapidly can boats be towed upon them.

Grubbing and clearing,	at \$100 per mile	\$120
Embankment, 66,763 cubic yards,	8 cts per yard	5341 04
Two road bridges,	\$200 each	400
Fence on both sides.	\$1 per rod	384
		<hr/>
		\$6,245 04
		<hr/>

Section 2. Equal 180 chains.

Here we begin to rise into deep cutting, which continues fifty-six chains. Thence forward, the ground is more favorable, and continues so seventy-two chains, where it falls off below bottom. The hill comes in at this place at an angle of 45 degrees, and will serve for one side of the canal. As far as this continues which will be fifty-two chains, the towing path bank only will be required. On this section, we cross two small runs, which may be taken into the canal with a waste weir at each, to discharge their floods.

Grubbing and clearing,	at \$100 per mile	\$225
Excavation, 46,852 cubic yards,	12½ cts. per yd.	5,856 50
“ 23,476 “ “	10 “ “	2,347 60
Embankment, 34,126 “ “	10 “ “	3,412 60
One road bridge,		200
Fence on both sides,	\$1 per rod	720
Two waste weirs,	250 each	500
		<hr/>
		\$13,261 70
		<hr/>

Section 3. Equal 328 chains.

Upon nearly the whole of this section, we have steep rocky hills, which in many places run close in to the river, and rise high above its bed. These passes are often so narrow, that considerable quantities of rock will require to be excavated, to make room for the canal, but as this is either a shelly slate, or detached masses of sand stone, it can be disposed of generally without blasting, and without great expense.

The side of the canal next the river, must be supported with a stone wall, which can be made cheaply, as the materials for the work are very convenient and in great abundance. Earth for the tow path bank can be procured without difficulty, from above the rock upon the brows of the hills. In several instances, the hills which project in towards the river and through which we have to cut, are composed principally of a sandy loam. Where this is the case, I propose to carry up a protection wall, about a foot thick, upon the face of the bank, which will prevent it from washing and also from caving in.

Upon this section we cross four streams which will require culverts, viz. Jack's run; Spruce run; Lowry's run and Mite's run. These streams at the time I saw them, were nearly dry, but from the appearance of their banks, and from the intelligence which I received from observing men, I was satisfied that in flood times they send out large quantities of water, and that consequently large culverts will be required to discharge them. I therefore propose to make the first and second twenty feet span, the third with two arches, each twenty feet span, and the fourth ten feet span.

Grubbing and clearing	at \$150 per mile	\$615
Excavation, of rock	121,166 c. yds. at 25 per yd.	30,291 50
“ do.	67,818 30	20,345 40
“ earth	148,396 10	14,839 60
Embankment, ag't. the wall	42,825 12½	5,353 13
“ at the culverts	53,990 10	5,399
Mason work for culverts	2,676 perch \$2 per perch	5,352
“ for protection wall	46,337 40 cts.	18,534 80
“ on burmside	13,952 35	4,883 20
		<u>\$105,613 63</u>

Section 4. Equal 644 chains.

This section is more favorable than the preceding one. The quantity of wall to be made, and of rock to be excavated, are comparatively much smaller, and for a considerable part of the distance the ground is so situated that nothing more than the towing path bank will be necessary. Several culverts and embankments however will be required, some of which will be large and expensive. The grubbing and clearing here will be heavier than upon any preceding portion of the line. Two small runs we propose to take into the canal, with a waste weir at each sufficient to discharge their floods. The excavation is generally easy, and the quantity not large in proportion to the distance.

Grubbing and clearing	\$250 per mile	\$2,012 50
Embankment at Tom's run	33,619 c. yds. at 12½ cts yd.	4,202 38
Kilbuck's	22,590 12½	2,823 75
Little Sewickly	32,985 12½	4,123 13
Big do.	39,781 12½	4,972 63
Several runs	14,890 10	1,489
For tow path	134,440 10	13,444
Excavation of rock	9,900 25	2,475
earth	96,672 8	7,733 76
Mason work for culvert } at Tom's run }	1472 perch at \$2 per perch	2,944
Kilbuck's	1,472 2	2,944
Small stream	332 2	664
do.	332 2	664
do.	332 2	664
do.	298 2	596
do.	152 2	304

Little Sewickly	1,592	2	\$3,184
Big Sewickly	1,886	2	3,772
For Protection wall	840	40 cts.	336
2 waste weirs		\$250	500
8 road bridges		200	1,600
5 farm do.		150	750
Fence on one side		50 cts. per rod	1,288
			<u>\$63,486 15</u>

Section 5. Equal 152 chains.

Entering upon this section, we find ourselves upon elevated ground ascending gradually as we proceed down the river. For the first ninety-two chains, its general surface is about twenty two feet above our level. The flats are nearly as much below it. The slope of the declivity is as $1\frac{1}{2}$ to 1. The next sixty chains carries us through the village of Economy, which stands on the bank of the river, and about seventy feet above it. The line of our canal was necessarily upon the same level, and along the brow of the bank, which falls off to the river at an angle of 45° . Here we shall encounter about forty feet of cutting. The construction of this part of the canal will be extremely expensive, owing to the great and unavoidable amount of excavation upon it, but as the soil is a loose gravel, and can be caved down and easily disposed of, the cost per cubic yard will be small.

Grubbing and clearing	100 dols. per mile	\$190
Excavation	161,460 c. yds. at 8 cts. per yd.	12,916 80
	274,620 5	13,731
Fence on both sides	368 rods, \$1 per rod	368
One side	240 50 cts.	120
4 farm bridges	\$150 each	600
		<u>\$27,925 80</u>

Section 6. Equal 652 Chains.

This section will embrace the remaining part of the distance to Beaver creek at its junction with the Ohio river. The commencement of it, is at the point where the highlands leave the river and where the first flats come in with such an elevation as to warrant the location of the canal upon them. They are still, however, considerably below our level and consequently much embankment will be required. Ground of this description characterises nearly the whole of this section.

The question would here naturally suggest itself, whether it would not be good policy to lock down upon these flats, and thus save the expense of so much embankment. This depends upon whether we cross the Beaver near its mouth or remain upon the east side of it. If we cross there is no doubt as to the propriety of locking down. This is a subject upon which the inhabitants feel much anxiety. Some contend, that the interest of the canal would

be best subserved by taking it on the west side, while others with equal zeal urge the claims of the east side. If no other considerations were to be taken into the account, than those which affect the expense and convenience of the canal, we should be prepared to decide, but not having become fully acquainted with the different views of the opposing parties and not having given much attention to the two routes with a view of determining which would embrace the most advantages, I thought it advisable to give a description and estimate of both and let the commissioners decide for themselves.

Grubbing and clearing,	\$800 per mile,	\$2,445
Embankment, on tow path side, 522,098 c yards,		
at 10 cents per yard,		52,209 80
Embankment across a ravine, 23,210 c yds	12½ per yd.	2,901 25
a run, 3,600	do	450
do 5,524	do	690 50
do 2,960	do	370
do 8,348	do	1,043 50
Crow's run, 31,947	do	3,668 37
Dutchmans, 14,714	do	1,839
Teaverbaugh's, 29,180	do	3,647 50
Mason work for a culvert, 705 prh.	\$2 per perch,	1,410
do 166	2	332
do 166	2	332
Crow's run, 1,592	2	3,184
Dutchman's, 209	2	418
Teaverbaugh's, 1,155	2	2,310
Excavation of earth, 39,900 c yards	10 cts, per yard,	3,990
Fence, 2,608 rods	50 per rod,	1,304
Nine farm bridges,	\$150 each,	1,350
One road bridge,		200
		<hr/>
		\$84,295 17

Estimate in case the West Side is adopted.

Grubbing and clearing,	\$800 per mile,	2,445
Embankment, 76,444 c yards,	12½ cts, per yard,	9,555 50
do on tow path 190,224 c yd.	10	19,022 40
Excavation, 39,900	10	3,990
Mason work for culvert, 550 perch,	\$2 per perch,	1,100
do 232	2	464
do 135	2	270
do 135	2	270
Crow's run, 867	2	1,734
Teaverbaugh's, 867	2	1,734
Three waste weires,	\$50 each,	1,050
Two locks = 16 feet,	150 per foot,	2,400
Two lock tenements,	200 each,	400

Nine farm bridges,	\$150 each,	1,350
One road do		200
Fence,	2,608, rods, 50 cents per rod,	1,304
		<hr/>
		\$47,288 90

Section 7. Equal 44 Chains.

This section is located upon a high bluff which forms the eastern bank of Beaver creek immediately above its junction with the Ohio river. The soil is principally a loose gravel, some of which is cemented together and forms strata of what is called breccia, a very difficult material to excavate. If these strata are continuous and extend far into the bank, they will occasion much expense. A road having been cut through the bank to communicate with the bridge which passes the creek at this place and which is a few feet below our level, presented a favorable opportunity for examinations. From what I could discover here and also upon the face of the bank where it falls off towards the creek, I was of opinion, they did not extend far in, but lay mostly in detached masses, so as easily to be undermined and tumbled down the steep bank below our level. We also have some rocks on this section. It is the red sand stone but lying in thin strata and so feebly cemented as to require nothing more than the pick or crow-bar to excavate it. It rises about ten feet above our level and traverses the whole of the section so far as we had any opportunity of making examinations.

Excavation of earth, 107,556 c yds. at 8 cents per yard,	\$8,604 48
rock, 46,244 20	9,248 80
One road bridge,	200
<hr/>	
\$18,053 28	

Section 8. Equal 180 Chains.

This section has very much the character of the sixth, being located along sideling ground where the construction of the towing path bank will constitute the greatest item of expense. Two streams, viz: M'Kinny's run and Moor's run, will be taken into the canal with a waste weir at each, to discharge their floods. One other small stream will be crossed by culvert and embankment.

Grubbing and clearing,	\$250 per mile	\$562 50
Embankment, 233,301 cubic yds.	10 cts. per yd.	23,330 10
" across a ravine, 25,911 "	12½ "	3,238 88
Mason work for for culv't, 209 perches,	\$2 per perch	418
Fence on one side, 720 rod	50 cts per rod	360
Two waste weirs,	\$350 each	700
Three road bridges,	200 "	600
Two farm do	150 "	300
		<hr/>
		\$49,509 48

Section 9. Equal 40 chains.

The ground over which this section passes, is remarkably favorable. The surface is very regular, gently sloping towards the creek, and has such an elevation in reference to our level, as that any cutting can be had on it; soil sandy loam.

Grubbing and clearing,	\$250 per mile,	\$125
Excavation, 11,400 cubic yds.	9 cents per yard	1,026
Fence on one side, 160 rod	50 cents per rod	80

\$1,231

Section 10. Equal 868 chains.

This section passes through the roughest and most difficult part of the valley of Beaver creek. It commences a little above Mr. Townsend's stone mill, and just at the acclivity of an elevated range of rocky bluffs, which extend along the eastern shore of the creek, and which rise in many places one hundred feet, perpendicularly above its bed. These continue for about a mile, and then as if by some violent convulsion of nature, they have been broken up and torn to pieces, and the whole face of the valley, upon both sides of the creek, covered with their ruins. So large and so abundant were these rocky fragments, some of which would measure eight hundred cubic yards, that in many places it was with the utmost difficulty we could carry along our level. We had at first, hoped that these difficulties on the creek would have soon terminated, and that we should at least have found a border of sufficient width for the canal; but this hope was not often realized. In some few places indeed, the rocks still rested upon the sides of the hills, and a recess was found sufficient for our purpose, but for the most part, they had tumbled down and filled up the whole space.

A canal upon the bank therefore to say the least, would be extremely expensive, and we are reduced to the alternative, either of constructing it in the channel of the creek, by carrying up a stone wall for the protection of its exposed bank, or of making slack water navigation, by means of dams and locks. Both of these methods are practicable, and neither will be attended with great expense. Should the first be adopted (and it will be for the first two miles,) the locks can be so located that in no instance, (except this) need we have a wall of more than twelve feet in height. Here there is a great descent in the creek, which is also so wide, that long and expensive dams would be required. Above this, the second seems to be the method which nature has designed for this part of the stream. The height of the banks is such, that no damage will be sustained by the overflowing of the water, and another favorable circumstance is, that the stream is very sluggish, having a fall of but sixteen feet in the whole distance, and that nearly all at three places.

The level with which we commenced at Pittsburg, has been maintained all the way to Beaver creek, four miles and fifty-six chains above its mouth, where it cuts the surface and runs out, making an uninterrupted level of thirty miles and twenty eight chains.

Estimate for the canal in the creek.

Mason work for protecting wall, up to Dr. Adam's mill, 48,941 perch at 40 cents,	19,576 40
Mason work for protecting wall, up to Irish ripple, 170,880 perch at 40 cents,	68,352
Embankment against the wall, 381,920 cubic yards at 10 cents per yard,	38,192
Three locks=24 feet, \$150 per foot,	3,600
Waste weir at Connequenessing,	500
“ “ Cunagham's run,	350
Three lock tenements, \$200 each,	600
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	\$131,170 40

Estimate for slack water navigation, commencing at Doctor Adams' mill.

Three dams, \$3000 each,	\$9,000
Two locks=16 feet, \$150 per foot,	2,400
Two lock tenements, \$200 each,	400
Towing path 8 miles 72 chains, \$2500 per mile,	22,250
Clearing out logs, stone, &c. \$100 per mile,	890
	<hr/>
	\$34,940

It will now be proper before proceeding any further, to give a view of our examinations on the west side of the creek. We commenced at Stones island, which is cut off from the main land by a deep channel worn through by the floods, and connecting the river with the creek (See map No. 7.) Thence by the village of Sharon and Old Briton, to Dr. Adams' mill, five miles and sixty-eight chains. This line I shall divide into two sections, which for distinction sake, I shall call intermediate sections.

Intermediate Section 1. Equal 148 chains.

Locking down as contemplated, sixteen feet from our Pittsburg level, puts us upon very favorable ground for this section. Across the flats, the amount of excavation will be nearly enough for making the banks, and along the high lands which border them on the west, scarcely any thing more than the towing path bank will be required. The aqueduct however, which will be five hundred and sixty-five feet long, with stone abutments and wooden trunk, will constitute a heavy item of expense, and one large culvert and embankment will swell the estimate to a very considerable amount. At the deep channel also will be some embankment.

In this canal is a favorable location for a series of locks to connect the river with the canal, should that ever be deemed an object of importance, which I have no doubt it will, if the Beaver and Shenango route be adopted. The ground in this vicinity is also very favorable for the formation of large basins which will cost but little and add much to the accommodation of the canal.

Excavation, 19380 c yds at 8 cts per yard,	\$1,550 40
Embankment on tow path side, 45000 c yds at 10 cts.	4,500
at Brady's run, 24,530 c yds at 10 cts,	2,452
Mason work, culvert, at ditto, 1324 perch at \$2 per perch,	2,648
Aqueduct,	50,000
Fence on both sides of canal,	384
1 road bridge,	200
2 farm ditto, 150 dollars each,	300
	<hr/>
	\$62,035 40

Intermediate Section 2.—Equal 320 chains.

On this section we have several high rocky bluffs, which rise up so perpendicularly, and run so close to the creek, that the canal must be constructed within its channel, and protected with stone wall. Between these bluffs there is some low ground, where embankment will be required. At Old Brighton our level runs out a little below Black Walnut run. Between this place and Doctor Adams' therefore, we shall have sixteen feet of lockage more than upon the other level. Here also will be some excavation, the canal passing along the bank where the ground is more favorable than below. At Doctor Adams' we cross the creek which can be done by a dam, and from which an abundant supply of water can be taken for the canal below. Black Walnut run must be taken into the canal.

Mason work, for protection wall 47,641 per. at 40 cts,	\$19,056 40
Embankment, against the wall, 105,820 c yds at 10 cents,	10,582
Between the bluffs, 14392 c yds at 10 cts,	1,439 20
Excavation of earth, 44,080 c yds at 9 cts.	3,967 20
Dam and wastewear at Black Walnut run,	500
Dam at Doctor Adams',	3,000
3 locks=24 feet (one at Doctor Adams',) \$150 per foot lift,	3,600
3 lock tenements, \$200 each,	600
Fence on one side of canal,	640
	<hr/>
	\$43,384 80

Comparison of estimates.

<i>For East side and upper level.</i>		<i>For West side and lower level.</i>	
6 section	\$84,295 17	6 section	\$47,288 90
7 do	18,853 28	1 Int. sec.	62,035 40

8	do	29,509 48	2	do	41,984 80
9	do	1,231			
10	do (in part)	27,948 27			
<hr/>			<hr/>		
\$161,037 20			\$151,309 10		

Difference in favor of the western side and lower level \$9,728 10

Note. If slack water navigation be adopted on section 10, the dam at Doctor Adams' will be common to both routes and then the difference will be three thousand dollars more.

Section 11 — Equal 5,064 Chains.

This section may be considered as generally favorable for canalling. It passes up Beaver creek to its junction with the Shenango a little below New-Castle, thence up this stream to Little Shenango, and up this to the mouth of Crooked creek.

Upon these streams are considerable bottoms, through which they take a meandering course, sometimes upon one side and sometimes upon the other, but generally leaving a border betwixt them and the high ground of sufficient width for the canal. Here with a little attention to the location of the locks, we can keep upon such ground as never to require excessive excavation or excessive embankment. In some instances however, these streams have passed quite across these flats, and in others points of ridges or bluffs project in and extend quite to them; these are places of much expense, where deep cuttings must be encountered, or the canal constructed in the creek with walls of wood or stone to protect it.

At four places (see maps No. 15, 16, 18,* 25,) the creek makes a great bend embracing narrow low necks of land on the west side, with high banks on the east. These places should be straightened, and thus make room for the canal and avoid deep cutting. Most of the streams on this section can be taken into the canal, some of which are durable and will make valuable feeders. We shall have a few culverts but none large or expensive.

Grubbing and clearing, \$300 per mile,	\$18,990
Excavation, for canal 1,096,287 c yds at 9 cts per yd.	98,665 83
thro' bluffs 153,508 c yds at 7 cts,	10,745 56

Note. The excavation of these bluffs can be done very cheap by the cubic yard, owing to the circumstance that they are always so situated as to be easily caved down in large quantities and the earth thrown into the creek without having far to carry it.

Excavation, through a rocky point 11000 cubic yards at 25 cents per yard,	2,750
Embankment, against the wall 260,658 cubic yards at 10 cents,	26,065 80
for towing path 240,013 c yds at 11 c,	26,401 43
over streams, &c. 25,480 c y at 12 c,	3,185

Mason work, for protection wall 30,048 perch at 40 cents per perch,	12,019 20
Timber, for ditto, 199,320 feet 4 cts per ft.	7,972 80

Note. Where stone cannot be had conveniently, I propose to use timber for this wall. That which lies under water will endure for a great length of time, and that which is above can be repaired with stone for a moderate expense when the canal is finished.

Dam and Wasteweir at Big run near New-Castle,	\$ 500
Neshannock at New-Castle,	1,000
Willow-ripple run,	400
Lackawannock,	900
2d Big run,	500
Two wasteweirs at small runs, \$250 each,	500
Mason work for culverts at small runs, 154 perch at \$2 per perch,	308
5 do at do \$295 perch at \$2 per per.	6,590
1 do at Pine run 212 per. \$2 per per.	424
1 do at Anderson's 212 perch at \$2 per perch,	424
1do at Little Shenango, 1,252 perch at \$2 per perch,	2,504
Excavation to turn creek (see map No. 15) 2736 cubic yards at 9 cents per yard,	246 24
Embankment at this place, soil easy, 12,920 cubic yards at 8 cents,	1,033 60
<i>Note.</i> A wall will be required here to protect the upper bank.	
Timber for the said wall 1000 c ft. at 4 cts per ft.	40
Excavation to turn creek (see map No. 16) 4883 yards at 9 cts per yard,	439 92
Embankment at this place 7332 c yds at 10 cts,	733 20
Timber for protection wall, 1000 ft. 4 cts per foot,	40
Excavation to turn creek (see map No. 18) 3290 cubic yards at 9 cts per yard,	296 10
Embankment at this place 7640 cubic yards at 10 cents per yard,	764
Timber for potection wall 3960 ft. at 4 cts per ft.	158 40
Excavation to turn creek (see map No. 25) 2925 cubic yards at 9 cents per yard,	263 25
Embankment at this place 8988 cubic yards at 10 cents per yard,	898 80
21 Locks equal 216 feet at \$150 per foot,	32,400
21 Lock tenements, \$200 each,	4,200
22 Road bridges, \$200 each,	4,400
43 Farm ditto, \$150 each,	6,450
Fence, 50 cents per rod.	10,128

\$283,337 18

Section 12. Equal 652 chains.

This section passes along the eastern declivity of the valley of Crooked creek. Here the ground is remarkably favorable for the location of a canal, having an even, regular surface, gently sloping towards the creek. This continues all the way to the Pymatuning swamp, where the section terminates. We cross no streams of importance. The timber is generally large, and the grubbing and clearing will be expensive.

Grubbing and clearing, \$500 per mile,	\$4075
Excavation, 182,328 cubic yards, 8 cents per yard,	14,586 24
Embankment, 51,120 " 10 "	5112
7 locks = 58 feet, \$150 per foot,	8700
3 lock tenements, \$200 each,	600
3 road bridges, \$200 each,	600
5 farm do. \$150 "	750
Fence on one side, 50 cents per rod,	2608
	<hr/>
	\$37,031 24

Section 13. Equal 368 chains.

This section lies wholly in the Pymatuning swamp, the surface of which is almost entirely level. It is composed of a vegetable deposit, varying from a foot or two, to five or six in depth. In some places it is tolerably firm, so as to support the weight of a man; while in others it is a soft, porous bog. Owing to this circumstance, I should anticipate some difficulty in constructing a canal here, were it not that the ground is so situated that it can be drained. With this advantage, the work can be carried on in the ordinary way, unincumbered by water, the great source of delay and expense, in some of the swamps and marshes in the state of New York.

Grubbing and clearing, \$500 dollars per mile,	\$2800
Excavation, 135,184 cubic yards, 6 cents per yard,	8111 04
4 locks = 47 feet, \$150 per foot,	7050
4 lock tenements, \$200 each,	800
3 road bridges, \$200 each,	600
	<hr/>
	\$19,361 04

Section 14. Equal 384 chains.

Leaving the Pymatuning swamp, we rise gradually, forty-seven feet in the distance of one hundred and sixty-eight chains. Thence eight chains, to the summit of the dividing ridge, which is twenty-eight feet above the surface of Conneaut lake. From this point, in sixty-eight chains the ground falls off to moderate cutting, which continues all the way to the lake, one hundred and forty chains.

2. For the same route, with slack water navigation.

1 to 9	From Pittsburg to Dr. Adams' mill	28	76		\$ 349,621	25
10	Wall to Adams' mill	1	76		\$ 19,576	40
do	Embankment to same place,					
do	Slack water navigation					
11, 12, 13, 14	From head of slack water to Coneaut lake	8	72	16	34,940	
		80	68	329	431,391	21
		120	52	345	843,910	81
	Add 10 per cent. for contingencies,				84,391	08
					928,301	89

3. For Canal on west side of Beaver creek and lower level.

	Distance.	Lockage.	Expense.
	Miles.	chains.	feet.
			dols. cts.
From Pittsburg to Economy	17	40	216,532 32
On section No. 6	8	12	47,288 90
" Int. section 1	1	68	62,035 40
" " " 2		16	41,984 80
" Section No. 10	8	72	103,232 15
Remaining sections to Conneaut lake	80	68	431,391 21
	121	20	902,454 78
Add 10 per cent. for contingencies			90,245 47
			992,700 25

4. For the same route with slack water navigation.

From Pittsburg to Adams' mill	31	40	32	267,841	42
On section 10	8	72	16	34,940	
Thence to Conneaut lake	80	68	329	431,391	21
	121	20	377	734,172	63
Add ten per cent. for contingencies				73,417	26
				807,589	89

The above estimates have been predicated on the supposition that the canal is to be twenty eight feet wide on its bottom, four feet deep, and having the slope of its banks as one and a half to one.

The locks I propose to make of wood, against which strong prejudices still exist, yet these are gradually giving way to the proofs of experience, and in the state of New York, where both stone and wood have been used, the latter material has now the decided preference. The difference of durability however, is still against this

policy, but the difference of expense is also much in its favor. Add to this the fact, that the repairs can always be done in the winter season without interrupting the navigation of the canal, and this objection has but little force. But to go more into detail. In the stat of New York, stone locks have cost one thousand dollars per foot lift on an average, but here I am told they can be built for six hundred and fifty dollars. Difference, five hundred dollars. This being applied to three hundred and forty five, the number of feet lockage on this canal, and it gives one hundred and seventy two thousand five hundred dollars. This sum being put at interest at the rate of six per cent. per annum, at the end of ten years will yield one hundred and three thousand five hundred dollars. I take ten years because I suppose that a wooden lock will remain during that time, with as little expense as would be required for one of stone. We will now suppose that at the end of this ten years, a sum of money equal to the original cost, must be expended to put them in repair. This is supposing what can never be expected to happen, but it puts us upon safe ground, beyond the reach of the most distant and unforeseen contingency. In this way then these repairs at the end of ten years, will amount to fifty one thousand seven hundred and fifty dollars, which being taken from the interest one hundred and three thousand five hundred dollars, leaves still a balance of fifty one thousand seven hundred and fifty dollars, which may be added to the principal and constitute a new one. The annexed table shews the saving for any successive period of ten years up to ten periods.

Periods.	TABLE.		Saving.	
	Principal.		Dols.	cts.
	Dols.	cts.		
First	172,500		51,750	
Second	224,250		82,800	
Third	307,050		132,480	
Fourth	439,530		211,968	
Fifth	651,498		339,148	80
Sixth	990,646	80	542,638	10
Seventh	1,533,284		868,220	46
Eighth	2,401,504	46	1,389,152	67
Ninth	3,790,657	13	2,322,644	27
Tenth	6,013,301	40	3,556,230	84

This last principal being added to the last gain, amounts to 89,569,532 24.

Having finished the duty first assigned me, I proceeded to the second, which was to make examinations across the dividing ridge, betwixt the head of the feeder at Meadville, by way of French creek, and what is called Beaver dam summit, to the bay of Presque Isle.

The first business that seemed to me to be necessary, was to settle the question as to the sufficiency of water on the summit level. I therefore proceeded directly to it, and gauged the principal feed-

ers, viz. French creek and Mile's branch, a little above their confluence.

This is the place where they can be conveniently taken out, and where, from examinations made by other engineers, I supposed would be the more suitable point, in reference to the summit to be supplied.

Being apprised that this was a route about which much anxiety was felt by the inhabitants in its immediate vicinity, and one also which deeply affected the canal policy in this commonwealth, being an important link in the great chain of its internal improvements, I felt a correspondent solicitude that all my measuring and calculations having a bearing upon its practicability, should be done with the greatest accuracy.

My first gauging was on the 12th of September last, during one of the most excessive droughts that was ever witnessed in that country. The method which I adopted here, and which I usually adopt in similar cases, was to take the longest place on the stream which combined the greatest uniformity of width, depth and velocity of current, I then divided it transversely into as many sections as seemed to be necessary, in order to a correct ascertainment of its cubic contents. These sections being taken length-wise, constitute an equal number of prisms, and having the depth at each division, these are calculated separately. And here I will remark, that wherever it is practicable, the velocity should be taken upon each of these prisms, and each calculated separately, for that velocity. It is evident that in this way we might come at the truth, and the difficulty attending it arises from the circumstance that the currents of the different prisms owing to the crookedness of the stream immediately above, or eddies, or other causes, are rarely ever parallel, so that floats cannot be kept upon any one, but are constantly thrown out of their course. The common method, and the one which I used, was to send down floats upon several different parts of the stream, for the purpose of ascertaining the velocity of each. The sum of these being divided by the number of trials, gives the mean superficial velocity. This would be nearly correct, if the stream were of a uniform depth, but where it is not, and as the velocity is always greatest where the stream is deepest, it is evident we should get too small a result. For instance, if there were much difference in the depth of the stream, by calculating the deep prism by itself, we might get a greater result, than by calculating the whole stream with the mean velocity. But there is another fact which should here be mentioned, that while with the mean superficial velocity thus obtained, we get too small a result, yet as this is greater than the velocity at the bottom, we also get too large a result. These errors may vary from each other in different places, but here from subsequent experiments, I found them about equal.

Upon these principles then, I proceeded to gauge the above mentioned streams. In French creek I found 23.25 cubic feet per second, In Mile's branch 16.8 cubic feet per second, amount-

ing to 40.05 cubic feet per second. A little below the confluence where I gauged the same day, the quantity found was 42 cubic feet per second. This coincidence satisfied me that no important mistake had been committed. This quantity however, is much less than they had ever before been known to yield. They had repeatedly been gauged by other engineers, and none found much less than 100 cubic feet, and some considerably more.

It was suggested to me that there were several dams above, and that some of these might have been shut down, and thus cause the difference. But upon enquiry, none appeared to be in this situation except Finley's which was about twenty miles above, on what is called the East Branch, heading in the state of New York. This had been closed for several days previous to my gauging, and mill owners below had perceived a diminution of water, which they ascribed to this cause. These mills however, were in constant operation day and night, till the day after I had gauged. From all I could learn, my impressions were that the dam had produced some effect, but to what extent it was impossible to learn. The people had various opinions upon this subject, but the most intelligent united in placing the decrease at about $\frac{1}{3}$ of the quantity on the day previous to the mills being stopped. But this still left the difference unaccounted for, and I was forced to the conclusion that the quantities I had found was very little different from the truth.

Under these circumstances, I had at first some doubts as to the propriety of continuing the examinations, and therefore wrote to Gen. Phillips on the subject, detailing to him the facts, and requesting his advice. His decided opinion was that I should go on, which I accordingly did, without delay. Our examinations resulted in the discovery of a more favorable route than we had before expected to find.

The feeder line commences on Mile's branch, about one mile and a half above its mouth, and runs across to the main branch about the same distance above their confluence. (See map No.

From this point it passes round the high lands which lies betwixt French creek and its tributary the Le Bœuf, and terminates at Brotherton's mill on the latter stream, 312 chains above its mouth. Its length is seven miles and fifteen chains, including the two dams, one of which is two chains and the other four and eighty-five hundredths in length.

Upon this line we have some deep cutting and some embankment, but neither of these will be expensive, and the intervening ground although rough and irregular in some places, may upon the whole be considered favorable. We cross no streams requiring culverts. The timber is generally large, and the grubbing will be proportionably expensive.

I propose to make this feeder ten feet wide on the bottom, four feet deep with its banks sloping, as one and a half to one. With these dimensions and with a descent of three inches per mile on its bottom, will be equal to the quantity of water which it is designed to discharge.

Estimate for Feeder line, equal 575 chains.

Grubbing and clearing \$150 per mile,	\$1,078 13
Dam across Mile's branch,	750
“ Main branch,	3,000
Embankment 65,677 cubic yards, 10 cents per yard,	6,567 70
“ against wall 7,447 cub. yds. 12½ cts per yd.	930 88
Excavation 95,340 cubic yards, 9 cents per yard,	8,398 80
“ deep cut, 12,181 cub. yds. 15 cts. per yd.	1,827 15
Mason work for protection wall 4,550 perch, 40 cents per perch,	1,820 20
Three farm bridges, \$100 each,	300
Four road “ 150 each,	600
Fence on one side, 50 cents per rod,	1,150
	<hr/>
	<u>\$26,422 86</u>

Section 1. Equal 608 chains.

From Brotherton's mill we carried our level along the eastern bank of Le Bœuf creek, where we found considerable steep side lying ground, which continued two hundred and twenty-eight chains. Thence one hundred and seventy-six chains, into smooth surface to the foot of the dividing ridge over which we pass with a very gradual and regular ascent and descent, in the distance of two hundred and four chains, making the cutting at the summit thirteen feet.

Grubbing and clearing \$400 per mile,	3,040
Excavation 231,436 cubic yards 12½ cents per yard,	28,929 50
“ through Bluffs 49,280 cub. yds 15 cts per yd.	7,392
Three farm bridges, \$150 each,	450
One road bridge,	200
Fence on one side, 50 cents per rod,	1,216
	<hr/>
	<u>\$41,227 50</u>

Section 2. Equal 748 chains.

At the commencement of this section, we come on one of the branches of Walnut creek, which lies in a valley of considerable width where an extensive reservoir may be conveniently constructed. With a view to this advantage, we carried our line down the valley one hundred and forty-four chains. Thence by a somewhat circuitous route, we gradually wound out of it into that of Miller's creek, in the distance of one hundred and twenty chains.

This valley is remarkably favorable under all the circumstances for the location of the canal. Reservoirs may be formed at almost every lock, and that without great expense, as the valley in no case is very wide.

At Major M'Nairs our line diverges from Mill creek, and passing near his brewery over level ground, it takes a north westward-

ly direction to the head of Navy yard run down which it continues to the harbor at the village of Erie.

This stream lies in a narrow valley with moderately elevated banks, where reservoirs may also be formed to great advantage.

Our termination was generally satisfactory to the citizens of Erie, and is one which in my opinion embraces more advantages than any other on the harbor.

Grubbing and clearing \$500 per mile,	\$4,675
Excavation to head of Miller's creek, 74,936 cubic yards, 10 cents per yard,	7,493 60
Ten locks, to head of Miller's creek, 100 feet lift \$150 per foot,	15,000
Towing path from head of Miller's creek to brewery \$1,700 per mile,	8,330
Forty-four locks, from head of Miller's creek to brewery 440 feet \$150 per foot,	66,000
Forty-four dams from head of Miller's creek to Brewery, \$500 each,	22,000
Excavation from Brewery to Navy yard run, 4,546 cubic yards, 9 cents per yard,	409 14
Ten locks, from Navy yard run to Erie, 100 feet \$150 per foot,	15,000
Ten dams from Navy yard run to Erie, \$400 each,	4,000
Towing path from Navy yard run to Erie, per mile,	\$1,500
	1,425
Eight farm bridges, \$150 each,	1,200
Seven road do 200 each,	1,400
Sixty-four lock tenements, \$200 each,	12,800

\$159,732 74

Section 3. Equal 2312 Chains.

This section embraces that part of the line on Le Bœuff and French creek, between Brotherton's mill and the head of the feeder at Meadville. The topographical character of the country here, is very similar to that on section eleven on the Beaver and Shenango route. For the greatest part of the distance we have fine open bottoms; but occasionally a high bluff puts in where the canal must either be constructed in the creek or deep cutting encountered.— We cross French creek near its confluence with the Le Bœuff, where an aqueduct will be required.

Grubbing and clearing, \$500 per mile,	14,450
Excavation, 273,904 c yds. 9 cts, per yd.	33,651 36
through bluffs, 88,051	8
8	7,044 08
Embankment, towing path, 18,244	12½
do against prot. wall, 155,08	do
155,08	19,488 50
Mason work for do 5,540 perch, 40 per yard,	21,416
culverts, 172	2
2	344
do 172	2
2	344

Aqueduct across French creek feeder 100 feet long, } stone abutment and wooden trunk,		16,000
Two culverts of wood,	\$50, each,	100
One do stone, at Gravelly run, 352 pch.	\$2 per pch.	704
do do do	172 2	344
do do Woodcock run, 450	2	918
do waste weir,		500
do do		300
do do		250
Lockage 133 feet,	\$150 per foot,	19,950
Thirteen lock tenements,	20 each,	2,600
Twenty-two farm bridges,	1 0 each,	3,300
Ten oad do	200 each,	2,000
Fence on one side,	50 cts, per rod,	4,624

\$150,608 44

RECAPITULATION.

	Distance.	Lockage.	Expense
	miles. chains.	feet.	dollars cents.
Feeder,	7 15		26,422 86
Section 1,	7 48		41,27 50
Section 2,	9 28	540	159,732 74
Section 3,	28 72	133	150,808 44
	<hr/> 53 03	<hr/> 773	<hr/> 378,191 54
Add 10 per cent. for contingencies,			37,819 15

\$416,010 69

On my return to Brotherton's mill for the purpose of commencing my examinations down French creek, I found there still remained considerable doubt and anxiety in the minds of some of the citizens of Waterford and of other places, interested in this route as to the quantity of water which was to supply its summit. Mr. Turnbull one of the United States engineers, who had previously gauged this stream, having heard the result of my gauging, returned and made a second admeasurement and although he found upwards of forty cubic feet less than before, he still found more than twice the quantity that I had.

I therefore, for the sake of accounting if possible, for this remarkable difference and of satisfying the people, determined to make another admeasurement, and that I might be the more likely to succeed in effecting my object, I appointed a day and gave notice to general Phillips and several of the citizens of Waterford, requesting their attendance at the time, that they might witness every part of the process and thereby be enabled to judge for themselves. This was the more desirable as some of them had paid considerable attention to the subject of measuring water and appeared fully to comprehend its principles.

Having no stop watch for measuring time, I used a pendulum.— It was of such length as to vibrate seconds, and made upon the principles laid down in the second volume of Hutton's mathematics and proved to be correct by comparing it with a clock of known accuracy.

On the third day of October, the day appointed, I went to the main branch of French creek a little below the place where I had gauged it in September, and from examinations of marks which I had made in the creek at that time, I found there was no sensible difference in its height. We then by means of logs, planks and earth, placed along the margin of the stream, were enabled to confine it to a channel of uniform width; which done, we proceeded to take the demensions. They were as follows, viz: Length 70 feet, breadth 31.4 feet.

We divided the stream transversely into six sections and took the depth at seven different places equi distant from each other, commencing and terminating at the margin. The following was the result.

	<i>Upper end of Col.</i>	<i>Lower end of Col.</i>
1 Depth,	19	68
2	49	89
3	76	98
4	1.14	98
5	1.28	1.07
6	1.25	1.03
7	69	83

With this data, the contents of the volume under consideration, is found to be 2,021 cubic feet; and it now only remains necessary, to know its velocity, in order to ascertain the quantity discharged in any given time.

This was done by sending down floats, upon five different places on the surface, equi-distant from each other. This is according to the method laid down in Rees' Cyclopædia, under the article "river," and the reasons for so doing, there given, viz. "Because the velocity in different places, is very different," are the same that governed us.

Beginning on the side where the water was shallowest, the first float went down in 129 seconds, the second in 98, the third in 69, the fourth in 51, and the fifth in 47. The mean of these, which is found by dividing the common sum of them all by the number of trials, is 78.8 seconds.

Now if 2,021 cubic feet are discharged in 78.8 seconds, then 25.63 cubic feet would be discharged in one second.

But this quantity is too large; because it is found with the superficial velocity, which is greater than the mean velocity. Calculating it by this, and we get only 18.95 cubic feet per second. But this quantity, for reasons which I have given above, is too small; and by calculating each prism by itself, according to its own mean velocity, the amount will be considerably increased. Being aware

of this fact, the above measuring was done, as much as possible, in reference to it.

The prisms upon which the velocities were taken, were five in number, all of the same width; and calculating each of them according to its own mean velocity, we have the following result:

1st prism,	1,342 cubic feet per second
2d “	2,660 “
3d “	5,022 “
4th “	7,830 “
5th “	7,280 “

Aggregate, 24,134 cubic feet per second.

Which is one and a half cubic feet less than that just found by the superficial velocity, and is only $\frac{88}{100}$ cubic feet more than that found in September.

During the time we were employed in gauging this stream, there had been a heavy fall of rain, and the storm was still increasing; so much so, that the streams were considerably raised, we were, therefore, compelled to return without gauging Miles' branch, as we had intended. But supposing this to have had an increase proportional to that of the main branch, and we shall perceive that the quantity in it at this time, must have been 1,743 cubic feet per second; which being added to that of the main branch, produces an amount equal to 41.56 cubic feet per second, for both.

If now, we take this to be the quantity, (about which I cannot entertain the least doubt) it then remains to be determined, whether it would be safe to depend upon it for the supply of this canal. No tributary feeders, of importance, can be brought in betwixt Erie and Captain Pollock's, a distance of twenty-two miles and twenty-two chains. Here I gauged the creek in September, and found the quantity of water to be 60 cubic feet per second. With this increase, and the gradual increase downwards, we may safely risk the remaining part of the canal. The feeder, as I have said before, is seven miles and fifteen chains long; upon which, although the evaporation may not be so great as upon the canal, yet as it lies all the way on side lying ground, the filtration will be greater, so that the waste of water here, may be considered as about equal to that upon so much canal. We have then, of canal and feeder, twenty-nine miles, upon which will be required, for evaporation and filtration, about fifty cubic feet of water per minute for each mile. This item then, will amount to fourteen hundred and fifty cubic feet per minute; leaving a balance for lockage and leakage, of one thousand and forty-four cubic feet per minute. I make no allowance for the latter item, for it cannot be large, and will be compensated by the small supplies which will always be obtained from the Le Bœuff and Mill creek.

The locks upon this level are to be 90 feet long and 15 wide. The lift, upon an average, will not probably be less than ten feet. Upon the north side of the dividing ridge, where the amount of

lockage is great in proportion to the distance, it will frequently be necessary to have the lift greater, in order to accommodate the ground. But taking ten feet for the average, each lock will contain 15,500 cubic feet, and may be filled with the supply above mentioned, once in every thirteen minutes; or, one hundred and eleven times every twenty-four hours. But in passing a summit, every boat requires two locks full of water; we, therefore, perceive that the extent to which this summit can be navigated, is equal to $55\frac{1}{2}$ boats per day. This remark, however, applies only to the dry season, when, judging from what happens on the New York canal, the least business will be done. In the spring and fall, when business is most active, there will be no lack of water; the quantity will be equal to the maximum use of the locks.

There is another circumstance which should also be mentioned: that the streams, according to the accounts of some of the inhabitants, have been gradually decreasing, on account of the improvement of the country; and they will, undoubtedly, continue to decrease, as the country continues to improve.

Respectfully submitted.

CHARLES A. WHIPPO, *Engineer.*

December 12, 1827.

No. 13.

To the Board of Canal Commissioners of the state of Pennsylvania
GENTLEMEN—

Agreeably to instructions, communicated by the Secretary of the Board, in June last, I repaired to the western part of the state, immediately after the general examination of the military academy, for the purpose of reconnoitering and surveying (as far as time would permit) the routes of the N. W. section of the Pennsylvania Canal, from the waters of French creek to the bay of Presque Isle.

The first of those routes to which my attention was directed, was that by the way of Conneaut Lake and the Valley of the Big Conneaut, upon which, having now completed the necessary plans and calculations, I have the honor of submitting the following report.

The operations of the survey commenced, of course, at Conneaut Lake, and had, for their first object, the determination of the various questions connected with the summit level.

Reverting to the report of last year, on the subject of the French creek feeder, it will be recollected that the dividing ridge between the waters of Conneaut Lake and those of Lake Erie pass at a moderate elevation within a few miles north of the former, and that among the various routes for crossing it, that by the east branch of Beaver Dam run is designated as the most favorable. Having fully satisfied myself on this point, on the former occasion, it only remained, with reference to this point of the route, to examine the ground a little more in detail. The experimental line, for this and

other purposes of the survey, was commenced at the surface of the Conneaut Lake, near the mouth of Beaver Dam run, and carried on the eastern side, generally as near it as was consistent with the accuracy of the level, to the height of land near Grier's Improvement, on the road west of Brightstown. Crossing the ridge at this point, and taking advantage of one of the tributaries of the Big Conneaut, the line was restored almost immediately to the level with which it commenced, at the surface of Conneaut Lake. This brief operation being sufficient, in addition to the work of last year, for determining the route and mode of construction on the summit level, the line was continued, without delay, down the Valley of the Big Conneaut. From the impression I had received of the character of this valley, and the nature of the ground in a direction towards Erie, I was led to believe that very important advantages would be gained, in point of distance and facilities of construction, by keeping the level as long as possible at the full elevation of the summit level, and the survey was conducted accordingly, along the eastern slope of the valley. At first, for a considerable distance on the line thus explored, the features of the ground harmonized very well with this plan; but, as the line gradually gained upon the surface of the slope, the difficulties greatly increased; and, at length, when the party had proceeded as far as the east branch of Big Conneaut, it became quite evident that the impediments already encountered, together with those fairly to be calculated upon in proceeding, would more than outweigh any advantages that could possibly be derived from the choice of this route. In coming to this conclusion, and abandoning the line which had been so far advanced, I should have gone back to the vicinity of the dividing ridge and brought down a new line through the bottoms of the valley had time permitted:—As the case was, I went back about six miles on my line and made an offset, contenting myself with connecting this work with that at the head of the valley by a line carefully run with the compass.

Upon examining the ground in the vicinity of the Forks of the Big Conneaut, and forward as far as Elk creek with the view of adjusting the level and direction of the new line, it was found, with few exceptions, unexpectedly favorable. A bench of smooth uniform ground presenting itself on nearly five miles of the direct route toward Elk creek, and at a sufficiently low level to admit of shunning the chief difficulties of the Conneaut valley. In this direction, therefore, the line was brought by the sources of Crooked creek to the valley of Hall's run, and so, by a rapid descent, into the bottom of that valley and the great valley of Elk creek. The crossing of this stream having generally been considered as one of the principal difficulties on this route, it became necessary to explore it with particular care. Several days were accordingly employed in examining the character of the valley, and in levelling and measuring at the different points selected as crossing places. Every thing being at length ascertained, upon which the comparison of these crossings could at all depend, the experimental line

was continued across the creek, and down the eastern side of the valley to the village of Fairview. At this point the ground was explored with a view of reaching, by the most direct and convenient route, a level bench of land which ranges with great uniformity towards Erie, along the north side of and a little below the Ridge road. Having satisfied myself on this point, the operations of the surveys were continued, without further hindrance, to the banks of Walnut creek.

The crossing of Walnut creek is another of the difficulties of this route, but of a very different character from the one first mentioned. It presents, indeed, a wide and deep chasm with very precipitous banks, which evidently cannot be passed without an expensive construction; but the face of the adjacent country is perfectly regular, and the level well preserved to the edge of the precipice on both sides; so that the crossing, so far as regards the adjustment of the route and the plan of construction, is reduced to a very simple case. Only a few hours were required to complete the examinations at this place, and transfer the level to the east side of the creek, after which the line was resumed and continued upon the same bench, and at the same average level as before. Every thing proved remarkably favorable on the residue of the distance to Erie, and it only remained to explore the ground in that vicinity, for the lockage down to the surface of the lake. This was accomplished, on the 18th of August, and with it the field duties of the party on this route were considered at an end, having occupied exactly five weeks from the time of their commencement at Conneaut Lake.

Having thus given a view of the operations of the survey, I proceed to notice, more particularly the character of the route and the nature of the various constructions connected therewith.

Section 1.—The Summit Level.

The discussion under this head, to be final, should evidently embrace the connexion of the summit level with the routes down the southern slope; but, as those are made the subject of separate surveys, not yet reported upon, I can only at present consider the route under discussion in its relation to the French creek feeder. The feeder, it will be recollected, was considered in my last year's report as terminating in the vicinity of the outlet bridge near Cummings' tavern, and at the level of eight feet above the habitual surface of Conneaut Lake:—At that point, therefore, (marked A. in the accompanying maps.) I take the commencement of the present line. An easy inflection carries it across the tongue of land on the west side of the outlet, and through a small portion of the lake to the western shore; it then skirts along the firm bank of that shore, and, in a very even course, by means of a few trifling excavations and embankments, until it passes Wolf Point, after which it changes slightly to the left, as the ground suits, and passing directly up the Beaver Dam swamp, falls into the course of

the run a little south of Lewis' Hill. Near this point, (marked B. in the maps,) the deep cutting commences; the line in the mean time passes by the bed of the stream, round the west side of the hill, and thence in a direct course through the swamp, to the bench-mark, (at station No. 49,) on the dividing ridge. About 100 yards beyond this, continuing the same direction, it strikes a head water of the Big Conneaut in the general course of which it descends, to the station No. 55, marked C.) where the cutting again runs out at the surface of the ground.

The construction on this line consists, for the most part, of mere excavation and embankment, and requires no particular remark, except as regards its connexion with Conneaut Lake. In the provisional examination of this summit, it is well detailed in the former report. The only view taken of this connexion, in the event of the canal passing on the west side of the lake, was by damming the latter to the eight feet level, and merely constructing a towing path along the western side. This was believed to be the most natural construction, and as converting the lake into a reservoir, to afford some security against the possible failure of a supply from French creek. The examinations of the present year, however, have shown so considerable a supply of water, from the springs and brooks of the northern slope, as to render this plan entirely unnecessary as a measure of precaution, while they afford also some reason to doubt its feasibility in other respects, in comparison with a separate construction. There are nearly 600 perches of the route above described which it appears will require embankment, from four to ten feet entire height. Now, in the first place, a simple embankment of this extent, exposed to the action and agitations of the lake, will be far more liable to accident than a canal embanked in the ordinary way and the consequences of a breach, besides that it will produce a much longer intermission to the navigation, will be more disastrous in every respect.

2dly. This mode of construction will cover a large extent of low ground at the head of the lake, with a thin sheet of stagnant water, the effects of which can hardly fail of being injurious to the health of the vicinity, and will also produce a considerable increase in the assessment of land damages.

Thirdly, the navigation if unprotected on the side of the lake, will be less safe and convenient than an extraordinary canal, and if so protected the expense of construction will be decidedly in favor of the latter. Fourthly, no advantage will be gained, in any event, in point of expense; for it is found by a careful estimation of both modes, that by giving proper attention to the construction of the dams, and including those at the foot of the lake, formerly estimated, the plan of raising the lake will cost from 500 to 1000 dollars more than the construction of a separate canal. Should the locating engineer, with the results of the southern surveys before him, agree with me in these opinions, he will cross the outlet by a culvert at Cummins', and make the whole line entirely indepen-

dent of the lake. Upon supposition therefore, I have made my estimate. The length of this section from the guard gate near Cummins' is 5 miles and 2'3 perches, 695 moderate embankment and the remainder excavation, generally moderate, and only 2 feet entire depth on the dividing ridge.

Second Section, down the valley of the Big Conneaut.

In detailing the field operations of the survey, I have already given some idea of two widely different modes, by which the canal may be conducted down this valley. First by keeping the level of the summit along the face of the eastern slope, and secondly, locking down through the bottom of the intervalle. The first of these was the plan upon which I commenced under the expectation of being able to shape my course more directly towards Erie, and of obtaining more convenient crossing places for the much dreaded valleys of Elk and Walnut creeks, the particular circumstances which induced me to abandon it in favor of a route down the bottom of the valley. I have now to remark, with respect to the valley itself, its lateral slopes were found remarkably intersected by ravines and gullies, produced in some instances by permanent streams, and in others, by the occasional wash of the country. These generally proceed from small beginnings at the distance of a mile or two from the margin and run out again to terminations equally small in the valley, but in the intermediate distance, and particularly at the verge of the slope, they have frequently the most extraordinary dimensions. The difficulty of running a level line over ground of this character is enhanced by the general pitch of the ground, valley and upland, towards the lake. For it generally happens in consequence of this, that a level taken over from the bottoms near the head of the valley cannot fail of encountering all the gullies, and as it rises on the face of the slope it must encounter them with greater and greater dimensions, until it finally crosses them at the very maximum of their breadth and depth. This was the case in the line actually run. In the course of ten or twelve miles from the summit, I had already experienced a remarkable increase both in the number and magnitude of the gullies, and by the time I arrived at the Erie county line, I had passed without counting those of smaller dimensions, no less than twenty which might be considered as extraordinary, some, often being from 100 to 200 yards in width and 50 or 60 feet deep. So far as the Conneaut valley was concerned therefore, there remained at this stage of the survey not the smallest doubt of the superior advantage of a line locked down through the bottoms. But I still indulge the expectation of securing great advantages in the length and direction of the route to Erie by keeping the high line, and it was not until I had passed the Erie branch of the Big Conneaut that the hopelessness of this route in all respects became fully manifest. I had then before me a district of very broken and irregular country, deeply intersected by the tributaries of Elk creek, on the left a system of parallel ridges, which a little further on assume a distinct and regular character, and intercepted all approach to

the lake except by deep cuttings or expensive constructions in the bed of some of the streams; and finally, the necessity of diverging considerably to the right of the proper direction in order to retain my present level if I would gain any advantage by it in the crossing of Elk and Walnut creeks. These and other similar considerations, determined me without scruple to the choice of the lower line. According to this determination, the line is located from the point C. through the first and second bottoms of the valley, in such a manner as to avoid almost entirely the irregularities of the higher ground. Lockage is introduced, as the declivity requires it, and at such particular points as shall best preserve the directness of the line, and its proper location in other respects. For the purpose of shortening it as much as possible, the upper part of the route is taken on the west side of the creek, and transferred as the latter increases in westing. The crossing place is perhaps taken rather high in location on the map, but on the ground may be adjusted at any point, as circumstances may determine, above, or in the vicinity of Forster's mill. The quantity of lockage which may be admitted in this part of the route depends partly upon the circumstances and character of the valley, and the nature of the ground on the further route towards Elk creek. Upon this principle it is taken at 170 feet which requires a moderate deep cutting on the further route, but avoids all the gullies of any magnitude in the valley except two, neither of which exceeds 70 yards in width by 20 and 26 feet in depth, respectively. This lockage is distributed in fifteen locks of 11 feet 4 inches average lift. One foot 4 being added for the purpose of passing (in an extreme lockage) $4\frac{1}{2}$ feet per second, more water than is passed by a ten feet lock, which quantity is required in addition to the supply from the springs and brooks of the northern slope, to compensate the evaporation and leakage on the remainder of the route towards Erie. The increased lift is also desirable on some other accounts, the construction will cost somewhat less; and the time of locking through the entire lift will be less by several minutes than would be required for passing seventeen 10 foot locks.

The length of this section from C, to the point D, (in Michael Jackson's meadow) is $16\frac{1}{4}$ miles. Its location on the map will probably require some corrections, as it was unavoidably laid down from compass notes only; but in the fine bottoms of such a valley, and with 170 feet of lockage there can be no difficulty in making these corrections in such a manner as to ensure the most direct and favorable route in all respects.

Third Section, from the valley of Conneaut to that of Elk creek.

This part of the route as already intimated, takes advantage of a very convenient range of level ground which skirts along the west boundary of Elk creek township, in the precise direction of the shortest route to Elk creek, and was ascertained indeed by an experiment for that purpose, that a lower graduation than the one above mentioned, which would have excluded us from the use of this ground, would have brought us upon ground of much less fa-

avorable character, and with an increase of no less than four miles in the distance to the creek. The only disadvantage accompanying it, but which would prove nearly the same in any location, is the crossing of Jackson's run and the east branch of the Big Conneaut. The former according to our graduation is a gully of 23 feet by 100 yards, and the latter 26½ by 176 yards, with a depression of about ten feet more in the bed of the creek. Both however, are sufficiently well provided with earth for the purpose of embankment. From the east branch, eastward, the ground is of the most favorable character; and the line passing by a slight deep cutting into the head of the valley of Crooked creek locks thrown 31½ feet, in three lifts, to a dividing level between that and the valley of Hall's run. Length from Michael Jackson's to the head of the grand lockage in the valley of Hall's run 6 miles and 9 perches.

Fourth Section, crossing the valley of Elk creek and the deep cut.

This valley has the character of an immense irregular gully, varying in the vicinity of our line, from 4 to 700 yards in width and cutting down through all the benches* of the lake slope, to an extreme depth of more than 200 feet below the level at which we approached it. To take in the whole of it, by any mode of crossing whatever, is of course out of the question; the only feasible method is to lock down into it to such a level as will reduce the crossing to reasonable limits, and then to wind down the east side of the valley until the descent of the country enables us to take the surface and resume our direction towards Erie. We thus gain also, the advantage of passing two parallel ridges of the lake slope, in connexion with the passage of the creek. The examination of the valley was conducted in conformity with this plan. Those places had been suggested as promising some advantages for crossing. First, at Anderson's mill dam, about a half a mile above our routes. The second, at Anderson's crossing place, near the Rich hill; (so called) also a little above our route; and the third, near the mouth of Hall's run, a little below the route. In examining these, a fourth point also attracted some attention, and was examined in comparison with the others, viz. about 400 yards below the Rich hill, and in a very favorable situation with respect to our route.

The points upon which these crossings were compared, were 1st, their relation to the routes; 2d, the height and depth of embankment necessary, and the supply of earth necessary for constructing it. 3d. The length and height of the aqueduct. And 4th, the facility in each case, of leading the canal by the east bank of the valley. The chief merit of the crossing at Anderson's mill, consists in the height and relation of the immediate bank, being such as to require little or no embankment, and an aqueduct of moderate length. On the other hand, however, its position with

* * * This word is used to express peculiar features in the slopes generally of the country under examination. Those slopes occurring in successive graduations, something in the form of ridges, rather than declivities. The level surface of each step is called a *bench*.

respect to the route, is rather an objection; and the difficulty of leading the canal *from* it by the east side of the valley, a very formidable one. In general, the immediate banks of the creek, on both sides, are precipitous, the stream having wore down its bed through the soil of the intervale, and to a considerable depth in the soft friable slate which constitutes the substratum. In some places, it has encroached upon the main branch of the valley in such a manner as to form a raw, crumbling precipice of 70 or 80 feet in height, with a steep rising acclivity, frequently 40 or 50 feet higher. One of these precipices, 280 yards long, occurs on the east side of the creek, nearly opposite the Rich Hill, and presents a serious difficulty in the way of any prospect which would require the construction of the canal along its face. No construction of the kind could be considered as safe then, unless supported, at least in part, by a wall of masonry, brought up from the bed of the creek; and this, which under any circumstances, would be a work of extraordinary expense, becomes a paramount objection in the present instance, in consequence of the scarcity of stone.

This objection applies equally to the crossing at Anderson's mill and that at Anderson's crossing place, both of which require a passage for the canal down the valley, by the way of this bluff. Considering these, therefore, as excluded, it only remains to institute a comparison between the other two, viz. One, 400 yards below the Rich Hill, and the other at the old mill, near the mouth of Hall's run. Both of these are in a convenient relation to the route, the first being approached by the eastern, and the other by the western side of the valley of Hall's run.

The Rich Hill is an insulated knob, situated between Hall's run and Elk creek, about half a mile above the forks. It appears to be the remnant of a tongue of upland, which at some former period, may have supported the valley of these two streams, and of which, another trace is left, in the form of a low, second bank, which extends down nearly to the hill. By taking advantage of this second bank in connection with the western slope of the hill, a canal may be brought at a convenient elevation, to within about 360 yards of the crossing place, with a very little extra labour. The remaining distance is an intervale bottom, with an average elevation of 34 feet above the bed of the creek. This would, of course, require embankment for any additional elevation; but the immediate vicinity of the hill, affords an abundant supply of earth for this purpose. The trough of the stream at the point of crossing, is 380 feet wide; but of this, 180 feet consists of low bottom, from 6 to 12 feet high, which may, with great convenience, be embanked to any additional height by the earth from a high, and rather steep bank, which overlooks it. In this way the aqueduct may be reduced to as little as 150 feet; which, in a vicinity badly provided with stone, is a point of some consideration.—Finally, the line from this crossing place, down the east side of the valley, is attended with little or no inconvenience whatever. Such is the crossing by the Rich Hill, that near the old mill is approached as

Already mentioned, by the western side of the valley of Hall's run. The upland, however, recedes gradually from the line on that side; in such a manner as to render some embankment necessary, for nearly half a mile, before reaching the crossing place. At 550 yards from the latter, the upland fails entirely, and on this distance an embankment would have to be constructed, at an average of at least 8 feet higher than that at the Rich Hill, besides a heavy culvert and extra embankment, at the crossing of Hall's run. The expense of these constructions, would be increased by the difficulty of procuring earth in convenient situations for the purpose; and for the same reason, it would be unadvisable to embank any portion of the low bottom of the creek; an aqueduct would, therefore, be necessary, to the full extent of 400 feet, which is the breadth of the creek at this point. The landing place on the east shore, is only 23 feet high, for the first 80 or 90 yards, which would require, therefore, a heavy embankment. The ground then becomes more elevated; but its height is still insufficient, and would require considerable embanking for 240 yards further. Under all these circumstances, the crossing place at Rich Hill, is considered decidedly preferable; having, at least, $\frac{1}{4}$ less embankment, a much more convenient supply of earth, and nearly two thirds less aqueduct.

The graduation of the level for the embankments and aqueduct, is determined, as in other cases, with some reference to the ground in advance. In examining its character for this purpose, it appears that a line, at any reasonable elevation, cannot so conveniently be carried out to the surface of the ground, as by a deep cutting north of the village of Fairview. The extreme elevation on the line of this cutting, is $108\frac{1}{2}$ feet above the creek, at the crossing place; and from a careful comparison of its length and volume, under various suppositions with those of the embankment, having in view also, the character of the ground on the route eastward, the crossing is established at $71\frac{1}{2}$ feet above the water of the creek: or which is the same thing, $160\frac{1}{4}$ feet above Lake Erie. This leaves 37 feet for the greatest depth to the top water line, on the deep cutting of Fairview. The elevation of our line, in approaching the valley at Hall's run, taking into consideration the declivity of the surface, from the summit to this point, is 306 feet above Lake Erie; and the above graduation gives, therefore, $145\frac{3}{4}$ feet, as the total descent to be effected by the lockage on the west side of the valley. This descent it is proposed to distribute in 14 equal lifts, down the side and bottom of the valley of Hall's run, by an arrangement which was suggested, and appears singularly favoured, by the circumstance of the ground. The first lockage leads by a slight, deep cutting, into the head of a large, deep gully, which descends exactly in the direction of the route. This may be divided by dams and locks, into six successive basins; from the last of which, a short oblique cut to the left, leads into another gully, capable of affording two more basins of the same kind. Two others may be added, by the construction of a single lateral dam, under favourable circumstances; and we have a complete chain of ten locks fol-

lowing each other in rapid succession, with a descent which brings the line nearly to the bottom of the valley at this point. The peculiarities of this arrangement are, that, with the exception of the short cut and lateral dam just mentioned, only four of the locks, and a very small portion of the canal, requires any excavation worth notice. Only three of the former, will even require breast walls, as the declivity affords, generally, an easy, natural descent, from chamber to chamber. The only possible ground of objection, is the rapid succession of the locks. The clear distance from wing to wing, being only 184 feet; but they are still made independent of each other, by the enlarged width and depth of the basins, the former of which can, with perfect convenience, be made as great as 30 yards at the top water line, and the latter, from 6 to 15 feet. We are thus, fortunately enabled to connect into a valuable auxiliary, the very circumstance from which the greatest embarrassments were expected, in the construction of this lockage. Should a more gentle descent, however, be desired, it may probably, be found by exploring to the right of the present location, and then connecting the line accordingly, as far back as the east branch road.

On the east side of the creek, the construction of the line, presents nothing particular or difficult, south of the ridge road. At that point, a very short tunnel, or deep cut and bridge, is necessary for passing under the road, and avoiding a sharp turn round the point. Three hundred yards further north, the deep cutting commences, and continues 283 perches, to the end of this section, where it runs out in the bottom and Hagerty's run. Total length of the section, from the head of the grand lockage to the end of the deep cut, at F, 3 miles and 239 perches.

- 5th SECTION.—*From Hagerty's to Walnut Creek.*

This passes in its whole length, upon a level bench of ground, at the foot of the north slope of the ridge upon which the ridge road passes, from which a number of copious springs issue, and afford a considerable addition to the supply of water. No locks accrue; and the only construction of any account, is a culvert, and moderate embankment at Trout run, and a short feeder for the introduction of that stream. Total distance, 5 miles 294 perches.

6th SECTION.—*The crossing of Walnut Creek.*

I have already made some remarks upon the character of this crossing, as a work of labour and expense, rather than of any great professional difficulties. It is a simple gulph of about 180 yards extreme width, and nearly 100 feet deep, but with bold, regular banks, rising on the west side fully, and on the east nearly to the level of the adjacent country. The point selected for crossing, is precisely that at which our level line struck the bank, and a little south of the land line which forms the south boundary of the lake range of lots. Its extreme width at the top of the banks, is 171 yards, and at the bottom 60 yards; and its depth $97\frac{1}{2}$ feet below the graduation line of the canal. On 120 yards of this width, it

is proposed to construct an aqueduct of five openings, and to complete the remaining 51 yards with embankments, for which there is plenty of earth, in very convenient situations, on both sides. A moderate embankment of 180 yards, is then only necessary for completing out the work to the upland bank, on the east side. Total length of the whole, from G. to H. 67 perches. Another locality for crossing, about 560 yards further up, was examined and measured in comparison with the one just described. To make use of it, however, would require, in ascending and returning, not less than 1100 yards additional length of canal; and it does not appear, from the measurement, to possess any superiority as a crossing place, that would compensate for the inconvenience and expense of this addition.

Seventh section, from Walnut creek to the crossing of Turkey ridge near Erie.

This passes over ground of the same character and equally convenient for the location and construction of the canal, as that west of Walnut creek; two or three slight ridges occur, crossing the route in the course of the first five miles, which render it necessary to retain thus far, the full height of the Elk creek graduation. The last of these is passed in the vicinity of M'Creery's farm soon after entering the state reserve, and then it is recommended as favouring the directness of the route, to commence locking down. Four locks of 10 feet lift are located from this point to the ridge. The first, a little eastward of M'Creery's road; second, between Eldridge's and Green's improvements; the third, at the east branch of Cascade run, and the fourth at the edge of the Turkey swamp. The last renders necessary a short deep cutting at Turkey ridge, but it is nevertheless preferable, as diminishing by one lift the lockage from that point to the lake. Short feeders on this section enable us to appropriate the waters of three branches of Cascade run, and of Ichabod's run.

Length from the point H. at Walnut creek to the end of the cut at Turkey ridge, 7 miles 262 perches.

Section eight, from Turkey ridge to the termination in the Bay.

It now only remains to explain the mode of descending into the basin of Presque Isle. For this purpose three routes have been mentioned; the first by Mill creek, on the east side of the town; the second by a gully passing through the public square; and the third by the gully of Lee's run, on the west side of the town. As the first of these would be considerably greater in length than either of the other two, and as it promised no particular advantage, either on the score of construction or local accommodation, being also attended with the inconvenience of shallow water at the mouth of the creek, I did not think it necessary to bring it strictly into comparison with the other two. Of these the first named had the appearance of descending rather rapidly, for convenient lockage, from the public square to the water, and upon trial this was found to be the fact. It

is also objectionable as affording too little space in width, for the construction of the necessary locks and basins. The last named, viz. The gully of Lee's run was explored with much greater confidence of a satisfactory result. It affords, generally, a shorter and more direct route to the basin than either of the others; its declivity though great, is within practicable limits; its breadth is generally sufficient for the construction of the works, and finally, the point of its communication with the basin at the navy wharf, perhaps more favorable than any other, to the local as well as the general interests of the canal in all respects.

The lockage remaining to be distributed from Turkey ridge to the lake, is exactly 120 feet, allowing for the descent of the top water line from Elk creek to this place. This is distributed down the bottom of Lee's gully in 12 ten feet locks. The space is not insufficient, and the distribution could be made with perfect regularity to the end, were it not that the declivity is intercepted before it reaches that point, by a substratum of (soft friable) slate, ending in a precipice of twenty one feet, at the edge of the water. To meet this difficulty, four different modes have been considered. First, to continue the declivity of the canal, by sinking the three last basins into the rock; allowing to the last lock a slight projection into the lake. Secondly, to embank the whole of the last basin and two first locks beyond the ledge, which would bring the line with moderate excavation on the second basin, fairly above the surface at the third lock. Thirdly, to construct a lock of twenty feet lift, by means of lateral reservoir; and fourthly, to construct two contiguous locks exterior to the ledge.

It is unnecessary here to detail all the reasoning which has been employed in the comparison of these various modes. The points on which they have been compared, are first the expense; secondly the practical convenience; thirdly, their conformity with regard to expense of water and time of locking with the other locks of the canal. The result is a decided preference for the method of two *contiguous locks*, and it appears, indeed, that contiguous locks when limited, as in this case, to the number *two*, are in some respects superior to every other mode of lockage. Their attendance requires, that the upper chamber should be kept habitually full, and the lower one empty. When this is done, boats may lock through the whole twenty feet in either direction, in an average of ten minutes, whereas, other things being the same, a boat cannot lock through twenty feet, by two insulated locks, in less, one time with another, than fifteen minutes and a fraction. The extreme quantity of water for a full navigation is the same, being six locks full per hour, drawn from the superior level in both cases. The only point of inferiority is in the total working capacity. The six locksful per hour in two insulated locks, working together, will pass (in effect) *eight boats through twenty feet*, whilst the same quantity in the contiguous locks is only sufficient for passing *six boats* in the same time. This would be an objection to their use on the route of a canal intended for a very full navigation, but under or

dinary circumstances, and especially at the point where a canal unites with a different navigation, it is presumed a working power, of six boats per hour, will be found quite sufficient. It should be remarked further, that in point of *expense*, the contiguous locks have, generally, a considerable advantage. The mode of placing them in the present instance, will be such as to bring the upper lock first in contact with the ledge; giving to the lower one an extreme projection of 200 feet; the upper basin will then be found by a slight excavation in the top layers of the slate. By giving to this basin a breadth of fifty feet, and a slight additional depth, we may make its length as little as 290 feet from wing to wing, and this will enable us to adjust the level of all the following basins in the most convenient relation to the surface of the ground.

The final completion of the canal at this point will require some enclosure on the side of the bay, for the safe harborage of the canal craft. For this purpose I propose the following plan, viz. To construct at the distance of 150 feet in advance of the last lock, a mole or pier 300 feet long, extending upward and downward in such proportions as may be determined by the depth of water. It may be strictly parallel to the shore, or converging towards it in a curve, at the extremity, and should be united with the towing path of the canal, on the line of the present wharf by a pier and bridge, sufficiently high for boats to pass under it. The construction of a quay on the land side, with other connecting piers and bridge is also a part of the plan, but these are more properly the objects of private enterprise.

The length of the section just described, from Turkey ridge to the mole, is one hundred and ninety six perches: And we are now prepared to sum up the total distance and lockage from the commencement near Cumming's bridge to the same point, viz. The distance 47 miles and 140 perches; about a mile shorter than the road; and the lockage 507½ feet in 48 locks; allowing ten inches for the declivity in the top water line produced by the feeding current, from the summit towards Erie. The drawings for illustrating the preceding descriptions, are first, A general map and profile of the whole route on the scale of one inch to the mile. Secondly, A series of maps exhibiting the details of the whole, on the scale of five inches to the mile.

The location of the route is carefully laid down upon the latter by the same scale, and upon the principle, as far as other conditions would admit, of reducing the labor of excavation to the smallest possible amount. Should this route be adopted, and the views of the engineer approved, the actual location, except in the Conneaut valley, may be accomplished (supposing the levels accurate) by the mere transfer of the measures from the paper to the ground. Before entering upon the general estimate, it will be proper to give some explanations relative to the construction of the works in masonry.

The scarcity of materials has already been alluded to. No stone of a sufficient good quality for the works having been seen on the

whole route west of Walnut creek. Still however there is reason to believe that stone *may be* procured at every point where its use is required, at an expense not greatly exceeding its ordinary cost. At Erie there will be no difficulty, as stone of an unexceptionable quality is found at several places in that vicinity. At Walnut creek also, a stone which it is believed, will answer very well for the plans of the aqueduct at that place, is found in layers of 10 or 11 inches in the shallow water of the lake. From either of these localities stone may be furnished by a land carriage of *four miles*, for the works on Elk creek. For those in the Conneaut valley it is thought that stone of a suitable quality may be found on Fetterman's run, and probably near Jenk's mill, or in Jackson's gully; at all events, it is highly probable that the material may be obtained from one or other of these localities for all purposes, except that of the face work and coping. Under these circumstances the cost of masonry will vary at different points of the route, very nearly at the following rates.

At Erie and Walnut creek, good ordinary masonry suitable for foundations laid in cement, per perch of 25 feet, at	\$2 50.
Best jointed work laid in like manner (face dressing not included) per perch of like measure,	\$2 85
At Elk creek the ordinary kind will cost,	2 80
The best,	3 15
In Conneaut valley the ordinary will average,	3 00
The best,	3 40

Bricks may in many cases be substituted with advantage; if burnt for the purpose, but the ordinary bricks of the country are wholly unfit for any purposes of construction, whatever.

The culverts and other small constructions not being greatly affected by these variations, are calculated at the average. According to this mode, small culverts of *three, five and seven* feet in an embankment of ordinary depth, are estimated for the whole line, at \$285, 375, and 480 respectively.

Those of 9 feet will cost about,	\$610
Stop gates are estimated in a similar manner,	672
Waste gates of masonry (for every opening of eight feet) at	271
Weirs of masonry for a lip of 20 feet,	465

Other works however, as the locks and aqueducts, require a more particular estimation.

Locks. These are supposed to be constructed of the most substantial masonry throughout. All the face work, and coping, rough cut, and the bottoms finished with rubble and a *good flay pavement* or *reversed arch of brick*. The *breast walls* should be set above the recesses of the head gates, and the latter constructed in all respects by the same model as those of the fall.

A lock of this construction of 10 feet lift, and at the Erie prices of masonry, will cost \$6,530, viz:

1220 perches best masonry, at	\$2 85	3,447	
822 ordinary, do	2 50	805	
5940 square feet face cutting,	15	891	
			5,143
90 perches rubble, at \$1 50 and 1,680 square feet brick work at 25		555	1,387
750 yards excavation (extra) and 130 yds puddle		142	
Grillage and sheet piling,		125	
Gates and all fixtures,		565	
			\$6,530

A similar lock with a lift of 10.41 feet (and supposing half breast walls) according to the prices of masonry at Elk creek, will cost \$7,019 50 viz:

1210 perches best masonry at	\$3 15	3,811 50	
339 ordinary, do	2 80	924	
5980 square feet face cutting,	15	897	
			5,632 50
Other items the same as on the preceding page,			1,387 00
			\$7,019 50

The same mode of estimation for a lock of $11\frac{1}{2}$ feet lift and according to the estimated prices of masonry in the Conneaut valley, would give for the total cost, \$7,812

Aqueducts. A variety of modes have been discussed, for the great aqueducts of Elk and Walnut creeks—differing chiefly in the materials and construction of the trunk. One mode of construction would consist of a simple wooden trunk, laid without any artifice upon piers of masonry; but this, as it requires a great number of piers, would be altogether unadvisable, in a case where the piers themselves constitute so considerable a portion of expense. Another mode admits a large space between the piers, and gives intermediate support to the trunk by means of wooden frames. A 3d, in the same case affords the intermediate support by frames of iron. A 4th, employs a trunk also of iron, and a fifth consists of arches and a complete structure of masonry.

The system of construction by means of wooden frames, cannot be recommended in any work of this kind of more than ordinary magnitude and expense, and in the situations at Elk and Walnut creeks, where in consequence of the great height, the saving in first cost would be but a very inconsiderable part of the whole, and where for the same reason, any great liability to repairs would be a peculiar evil, they are considered as decidedly objectionable. The same objection, does not apply to the same extent to a wooden trunk, where the supporting system is composed entirely of imperishable materials, though undoubtedly, the most perfect

structure would be that which is built entirely of iron or stone. To the latter material, there is one system in the present case on account of the extraordinary expense attending the construction of scaffolding, centres, and other accessory works for turning an arch at so great a height. An iron frame on the contrary, requires no such preparation, it may be set up in the most expeditious manner, without any centering or extra scaffolding whatever, and becomes immediately the means of completing the remaining parts of the structure. It may be added, that the practical advantages of this mode of construction, are now no longer matter of mere conjecture. One of the finest aqueducts in the world, and in a situation strongly resembling those under consideration, is constructed of iron; and fully confirms after nearly twenty years use, the opinions and calculations of its engineer. Under all these circumstances, my own preference inclines to a structure in which the supporting frames are of cast iron, and the trunk either wood or iron as may be preferred. The system proposed for the frame, is a little different from that of Mr. Telford, especially if the wooden is used. In that case, the object should be to give two lines of intermediate support to the sleepers of the trunk, and avoid as far as possible, all other strains. For this purpose each rib is made to consist of two *rafters* and a crown *beam*, having altogether, a clear span of sixty-four feet and ten feet rise. The crown beam is *entire*, but the rafters are longitudinally halved, and the feet of the halves spread asunder, on the impost to the distance of $5\frac{1}{2}$ feet. The opposite rafters (of the *same pier* but in different arches) are connected across the top of the pier, from head to head, by chains or bars of wrought iron, which will also assist in setting the frames, and the middle of the rafters is supported in a similar manner by a wrought iron tie. Five ribs connected by strainers of cast iron at five points, complete the frame, which is twenty-two feet wide.—The strainers placed at the junction of the rafters and crown beam, rise somewhat above the rest of the frame with a strong flanch upon which the sleepers of the trunk are bolted down in such a manner as to touch the frame in no other point. The trunk is twenty feet wide in the clear at bottom, and 22 at top, the horse path $4\frac{1}{2}$ feet wide, projecting over the water. The cost of one pier and arch, for an aqueduct of this description 70 feet high, may be estimated as follows, viz:

Pier (12 feet by 38) on the base, and 8 by 20 under the
plinth of the impost, 814 perches best masonry, at \$4 incl
cluding machinery, \$3,376

Frame 23 tons cast iron, delivered and set up, at \$150
per ton, \$3,450

One and a half tons wrought iron chains Tiester, at \$150, 225

Wooden trunk 2100 superficial feet, caulked, sheathed, lined, &c. at \$30,	630
Horse path, rail, &c.	100

Total, \$7,781

For a height of 98 feet, the estimate will stand thus,	
Pier, viz: 1103 perches masonry at \$4.	4,412
Frame, trunk, &c. as before,	4,405
	<u>\$8,817</u>

An iron trunk (the work remaining in all other respects the same) is estimated for each arch, at an additional ex- pense of	\$2,260
And an arch of stone, at least	3,062

Estimate. Section 1st, From A. near Cumming's bridge to the end of the deep cutting, in the valley of big Conneaut, at C.—5 miles 213 perches, viz: 3 miles along the lake shore and through the low grounds of the Beaver dam run, and the remainder extra cutting through the dividing ridge; extreme depth to top water 18 feet.

Excavation 361,876 yards at ordinary depths, easy digging, averaged 7 cents, \$25,331 32	
239,740 deepest cutting and embank- ment, 10	23,974 00
	<u>\$49,305 32</u>
Puddling on 404 perches at \$3 50 per perch	1,414
Culverts, viz: 1 of 14 feet at the outlet, \$1,240 and one of 9, equal 610,	1,850
3 of 5 feet, at \$3 75 as formerly estimated,	1,125
	<u>2,975</u>
Bridges, viz: 1 at 140 and 2 at 250,	640
Grubbing on $4\frac{1}{2}$ miles at \$240 and fence,	2,440
	<u>\$56,776 32</u>

Section 2d. From the end of the deep cut to Michael Jackson's near the forks of the big Conneaut 16 $\frac{3}{4}$ miles, through the intervals generally slight profile and easy digging; lockage 170 feet.

Excavation, viz: 571,768 yds ordinary levels, av. at 7 c.	40,023 76
“ 156,196 “ “ 8	10,895 68
“ 160,405 short embankments, 10	16,040 50
	<u>\$66,959 94</u>
Puddle on 788 perches at \$3 50 per perch,	2,758
Culverts, viz: 1 of 14 feet at the two crossings of the Conneaut,	1,240

Culverts 2 of 9, \$610 and 4 of 7 at \$480	3,140
“ 15 of 5, 375 16 of 3 285	8,475
	<hr/> 12,855
Waste gate of 2 eight feet openings, at \$271 50 as formerly estimated,	548
Bridges, viz: 4 at \$250 and 15 at 140,	3,100
Locks viz: 15 of $11\frac{1}{2}$ feet average fall at \$7,812	117,180
Grubbing $11\frac{1}{2}$ miles and fencing $16\frac{3}{4}$	5,360
	<hr/> \$208,755 94

NOTE.—The Lockage by means of 17 ten feet locks would have cost at the Conneaut prices, \$125,664

Section 3. From Michael Jackson's to the head of the lockage at Hall's run, 6 miles and 9 perches. Crosses Jackson's gully and east branch of Big Conneaut and has a slight extra cutting near No. 8 brook; otherwise favorable ground and easy digging. Lockage 31 feet 9 inches.

Excavation, viz: 231,260 yards at ordinary depths, averaged at 7 cents.	16,188 20
125,969 embankments, 12 cents,	14,866 28
	<hr/> 31,054 48
Puddle on 370 perches at \$3 50 per perch,	1,295
Culverts, viz: one of 30 feet at east branch of Conneaut 814 perches, at \$3 75	3,052 50
520 perches, at 1 75	880
Centering, &c.	980
	<hr/> 4,912 50
One of 9 feet = 610, two of 5 at \$3 75 and three of 3, at \$2 85,	2,115
	<hr/> 7,027 50
Bridges, viz: 4 at \$2 50 and 7 at 1 40,	1,989
Locks, viz: 3 of 10 feet 7 inches lift at 7,019 50,	21,058 50
Grubbing on three and a half miles and fence 6 miles,	2,630
	<hr/> \$65,048 48

Section 4. This includes the lockage at Hall's run 145.9, the crossing of Elk creek and the deep cut at Fairview. Total three miles 239 perches.

Excavation, viz: 180,610 yards at ordinary depths, averaged at 7 cents,	12,642 70
251,600 embankment at the crossing of Elk creek, at 12 cents,	30,720
482,16 deep cutting, viz: 270 perches, extreme depth 37 feet to top water, at 14 cents,	67,682 26
	<hr/> 110,849 94
Timber work in the dams, at the lockage, 14,400 feet at 5 cents,	720

Puddling, viz: 2,800 cubic yards at the lockage, at 30 cents, and 536 perches in line, at \$3 50,	2,825
Locks, viz: 14 of 10.41 feet lift, at \$7019 50,	98,273
Aqueduct of 3 spans, at \$7,781 each,	23,343
Extra abutment,	3,376
Wings 2,468 perches, at \$2 50,	6,910 40
	<hr/> 33,629 40

Culverts, viz: one of 14 feet at Hall's run and one of 5 feet at Deadman's gully,	1,615
Safety gates and waste gate with two 8 feet openings, as formerly estimated,	1,888
Bridges, viz: 3 at 140 and 3 at deep cut, average at \$400,	1,620
Grubbing and fencing,	665

\$252,085 34

Section 5. From Hagerty's to Walnut creek, 5 miles 294 perches, slight embankment at Trout run; the remainder very favorable except that the soil requires extensive puddling. Very easy digging.	
Excavation, viz: 195,810 yards, at ordinary levels, averaged at 7 cents,	13,706 70
38,000 embankment, }	4966
At Trout run, 13 cents, }	
	<hr/> 18,672 70

Puddle, viz: 1,626 perches, at \$3 50,	5,691
Culverts, viz: 1 at 12 feet at 925, 2 of 5 feet, at \$75 and 2 at 3,285,	2,245
Bridges, viz: 8 at 140 and 4 at \$200,	1920
Grubbing, on 4 miles, at \$340 and fencing 5- $\frac{7}{8}$ at 240,	2,770

\$31,298 70

Section 6. Crossing Walnut creek to the upland on east side 67 perches.	
Excavation 36,600 yards for embankment at 12	4,392
Aqueduct of 5 spans, at \$8,817,	44,085
Extra abutment,	4,412
Wings 3,912 perches,	9,780
	<hr/> 58,277
Puddle on 44 perches, at \$3 50,	154
Safety gate and waste gate as at Elk creek,	1,888

\$64,781

Section 7. From Walnut creek to Turkey Hill, near Erie, 7 miles and 262 perches. Very favorable ground except a porous soil as in the former instance, and slight extra cutting at Turkey Hill. Lockage 40 feet.	
Excavation, viz: 229,350 yards slight profile, including three small feeders 7 cents,	16,054 50
117,10 embankment and interior digging, at 9 cents,	10,539 90
	<hr/> 26,594 40

Puddle on 1,920 perches, at \$3 50,	\$6,720
Culverts, viz: 3 of 7 feet at \$480 and 3 at 3 feet, at 285,	2,295
Wier of 20 feet lip as formerly estimated,	465
Locks, viz: 4 of 10 lift, at \$6,530,	26,120
Bridges, 9 at \$140 and 3 at 250,	2,010
Grubbing three and one-fourth miles, at \$340 and fence seven and three-fourth miles, at \$260,	2,965
	<hr/>
	\$67,169 40

Section 8. From Turkey Hill to Erie harbour, one mile and nine perches, with a lockage of 140 feet.

Excavation, viz: 34,415 yards and ordinary depths, at 7 cents.	2,409 5
3,692 in loose slate at 35 cts,	1,292 20
	<hr/>
	3,701 25
Puddle, 360 yards at 30 cents per yard,	108
Locks, viz: 12 of 10 feet lift at 6,530,	78,360
Extra walls at the ledge, 280 perches at \$2,	560
	<hr/>
	78,920
Bridges, viz: 5 at \$300,	1,500
Grubbing and fence,	265
Pier, 140 yds. long 9,300 feet square timber at 6 cents,	558
6,720 of plank, at 6 cts,	403 20
4,200 of round timber, 2½ cts,	105
1,400 of stone, at \$2 75,	3,850
	<hr/>
	4,916 20
	<hr/>
	89,410 45

SUMMARY.

Section 1.	56,774 32
2.	208,775 94
3.	65,045 48
4.	252,085 34
5.	31,298 70
6.	64,781
7.	67,169 40
8.	98,410 45

Grand total, \$835,320 63 Or 17,620 per mile.

Of this aggregate the crossings of Elk and Walnut creeks, including the embankments and deep cuts, make up \$196,084 $\frac{64}{100}$, which being deducted gives at the rate of \$13,481 per mile for the cost of the remaining works. The total expense for lockage at \$672 $\frac{30}{100}$ per foot lift is \$341,551; deducting this also, leaves \$297,685; or \$6,280 per mile for the cost of all the other works.

All which is respectfully submitted.

D. B. DOUGLASS,

Professor of Engr. U. S. Mil. Academy.

The following notes and calculations are submitted to the board, relative to the supply of water for the Waterford summit, and the various questions connected therewith.

As the season was rather unfavorable for the operation of gauging, in consequence of the frequent rains having raised the streams somewhat above their ordinary summer discharge, I adopted the following plan, by concert with Mr. Ferguson, for obtaining the supply under the influence of the drought of 1826. It will be recollected, that in the course of the survey of that year, the waters of French creek were gauged with some care at Meadville, and as it was reasonable to suppose that the ratio of discharge for different seasons was nearly the same at that place and at Waterford, it was now proposed to repeat the measurement there, for the determination of that ratio, at the same time that my measurement was performed at the (2d.) forks.

The point selected for the measurement near the forks, was one at which the breadth, depth and velocity of the stream within the line of the operation continued as nearly uniform as possible, the latter being nearly as could be obtained, the result of mere declivity. Two parallel sections (60 yards apart) and the superficial velocity, were measured in the usual way, the latter by means of thin wooden floats so adjusted as to be immersed in the surface of the fluid. The mean velocity was then deduced in the most careful manner from that of the surface, and the product of this and the mean transverse section evidently gives the quantity of the discharge. The measured velocity was 1.162 feet per second, the calculated mean = 0.845 feet per second, and the mean transverse section 105.9 square feet; whence the total discharge is obtained at 89½ cubic feet per second, very nearly. On the preceding day, the water of Le Boeuff creek had also been gauged and found to afford a supply of 5.6 feet per second, which being also available for the purpose of the summit level, was added to the preceding in estimating the entire supply, the result corresponding to the measurement is 95.1 feet per second. The measurement of Mr. Ferguson was performed at Rodger's ferry in nearly the same manner, except that as the superficial floats were found to be effected by a breeze down stream. Another mode was also employed for the velocity of submerged floats, which is believed in this case to furnish the more accurate result. The quantity calculated from it is 257.55 feet per second. It was remarked by Mr. Ferguson, that the creek was falling at the time of the measurement; and in connection with this remark, it should be understood that my measurement was accidentally deferred till the following morning. The least that could be allowed for the fall in the meantime would be $\frac{8}{100}$ part of a foot, which would give 255.4 feet per second for the discharge at Meadville, corresponding (in time) with the gauging at Waterford.

Comparing this with the result of the preceding year (158.9 feet) and reducing the Waterford supply in the same ratio, we obtain $59\frac{1}{2}$ cubic feet per second as the supply of the summit in question under the influence of the drought of 1826, and it is not probable that it will often be found lower than this limit.

This it must be allowed is a very moderate supply for the wants of a summit level, but it is not very difficult to adopt a system of lockage to it in the present case in such a manner as to afford in many respects the advantages of a large supply. The mode of proceeding would be as follows:

Assuming the length of the summit level, including the feeder, at twelve miles, if we deduct from the whole supply, the quantity due to evaporation, leakage and waste on this distance, say 13 feet per second, we shall have $46\frac{1}{2}$ feet per second, as the quantity available for the lockage, the half of which $=23\frac{1}{4}$ feet per second, may be drawn off for this purpose at each extremity of the summit level. This we find is sufficient for the supply of a 10 foot lock, in constant use, and a mile of evaporation and soakage besides, whence we infer that locks of this lift may be used at the extremities of the summit level and for a mile down the slope on either side, without any danger of experiencing a deficiency of water. In proceeding further down the slopes however, the surplus of evaporation and soakage will no longer suffice for such a lockage, and then it becomes necessary to determine such a diminution of the lift as shall always bring the demand of the locks within the limits of the supply. On the calculation for this purpose, I assume the entire length of the canal which is to be fed from the summit at 34 miles, viz. from Erie to the nearest point on French creek at which another feeder could be taken in. The expenditure of water on this distance for all purposes except lockage would be $31\frac{1}{2}$ feet per second leaving in round terms 28 feet per second still available at the extremes, or 14 feet per second at each. The locks which would be exactly graduated to this supply, would have a lift of $6\frac{1}{2}$ feet, but as it is not probable that the locks will often be pressed to their utmost working power, or that the water will be reduced to as low a limit as the one used in these calculations, it will be sufficient to make the extreme locks of 7 feet lift at least, which is better adapted to the ordinary state of the case.

Briefly stated then, the mode will be as follows, viz. to make the locks at each end of the summit level, and for a mile down the slope on each side, of 10 feet lift, and afterwards to diminish the lift in a constant ratio per mile, so as to reduce those at the two extremes (of the 34 miles) to 7 feet each, and this will place the whole system in the most advantageous relation to the supply of water.

The exact height of the Beaver dam summit level I do not know, but it is estimated to range somewhere between 620 and 630 feet (above lake Erie) after a reasonable depth of cutting. If we assume it at 628 to the top water line, and suppose that five 10 foot locks may be graduated on the first mile of the descent towards

Erie, the remainder by the system of diminished lifts will require 68 locks with an average lift of $8\frac{1}{2}$ feet. On the Meadville side the number will probably not exceed two of the 10 feet lift, and about four with diminished lifts to the second feeder, (at the end of the 34 miles) after which about five more will bring the line to Benner's mill.

The practical utility of this system will not greatly differ from that of a system of 10 feet locks except that it will require on the part of each boat about 1-6 or 1-7 more time in performing the total lockage of the line; as to the cost, it will be about ten dollars per foot greater. As to the practicability however, so far as the supply of water is concerned, I have no hesitation in giving my opinion in its favor.

An apprehension having some times been expressed as to the delicacy on the Erie side being too great for the lockage, it may be proper to add, that no difficulty will be experienced on this account. It may be in the power of the engineer, indeed, in an extreme case, to construct as many as 17 or 18 locks on a mile, and yet preserve their perfect independence, and this it is presumed is a much more rapid lockage than can be required on any part of the line alluded to.

One further remark, may also be made in connection with this subject as regards the Conneaut route, viz: that from the smallness of the supply of water, to be obtained from French creek, and the necessary length of the feeder, (which is frequently found more expensive of water than the canal itself,) it is not probable that a sufficiency could be commanded on the summit for the supply of a canal by that route.

All which is respectfully submitted,

D. B. DOUGLASS,

Prof. of Engineering.

*Conneaut route in
inal M.S.P.*

No. 15.

To the Board of Canal Commissioners of Pennsylvania.

GENTLEMEN,

In pursuance of your instructions relative to the survey for a canal along the valley of the Delaware, I have made the necessary surveys and examinations from Carpenter's point to Easton, connecting them with the survey previously made from the latter place to tide water. In commencing the survey of the upper route my attention was first directed to the location of a dam at or near the point. With this view observations were made at different places, the most favorable of which is near Dunning's ferry, and about two and a half miles above the point. At this place the river is but four hundred and thirteen feet wide. A smooth surface of slate rock extends nearly across, making a permanent foundation for the dam. The Delaware and Hudson canal approaches within fifteen chains of the bank, on the New York side of the river, and the location is in every respect favorable for connecting the two canals.

if desirable. Believing this to be the most eligible situation for commencing the survey for the canal, I accordingly assumed a level seven feet above the surface of the water for the government of my examinations down the river.

This level will require a dam of ten feet in height, which, together with the fall in the river immediately below the anticipated location of the dam, will put the canal out of the reach of the floods, with but little extra expense.

The location of the canal upon which the estimate is predicated, is confined immediately to the valley of the river the whole distance. Examinations however, have been made from the Bush hill to the summit level of a proposed route, passing back of the mountain at Walpack Bend, and intersecting the river again at Broadhead's creek. The elevation of the summit is one hundred and twenty feet above the level of the river route, as located at the Bush hill, making two hundred and forty feet extra lockage. This, together with the difficulty of obtaining a quantity of water sufficient to supply the summit level, induced me to confine my estimate to the river route, as being the most eligible of the two.

In making the estimate, the line has been divided into sections of one mile, and minute estimates made of each section, predicated on the supposition that the canal is to be made entirely inland, four feet deep, and forty feet wide at the top water line, with locks fourteen by ninety feet clear in the chamber, including the cubic yards of excavation, embankment and wall, at prices varying according to the nature of the work, also fences, bridges, aqueducts, culverts and all other necessary appendages, except the locks and dams. The aggregate amount of each section so estimated may be seen by a reference to the schedule of estimates hereunto annexed. The amount added for lockage and the dam will be found at the close of the estimate.

The most important difficulties to be surmounted in constructing a canal on this route, are in passing bluff rocky mountains, that come close on the river, making it necessary to raise embankments in the river, which must be protected by walls considerably heavier than is required on the route south of the Lehigh.

These difficulties are more frequent than on the lower route. The bottom land is more undulating, causing frequent deep excavation and heavy embankments. This together with the additional amount of lockage, will account for the estimate so far exceeding that of the route south of the Lehigh.

Any further quantity of water that may be required, after leaving the river at Dunning's ferry, may be obtained from the tributaries of the Delaware, the most important of which are the Bush hill and Broadhead's creek.

A map of the route is now making and will be forwarded to the board as soon as completed.

All of which is respectfully submitted.

Signed,

H. G. SARGENT, *Engineer.*

Estimate of the proposed canal from Carpenter's point to Edston, in sections of one mile each.

No. of miles.	dols.	cts.	No. of miles.	dols.	cts.
1	10,343	64	37	7,501	17
2	18,710	82	38	38,883	69
3	4,311	53	39	9,843	43
4	4,516	53	40	15,013	92
5	3,545	38	41	30,843	60
6	15,625	48	42	21,801	50
7	17,896	57	43	32,748	07
8	5,051	26	44	60,660	00
9	23,105	62	45	14,117	73
10	7,842	99	46	9,299	25
11	25,364	00	47	9,604	42
12	24,723	71	48	7,731	86
13	18,531	19	49	4,382	60
14	30,391	30	50	13,851	72
15	8,201	17	51	9,460	31
16	17,305	22	52	4,106	88
17	22,248	26	53	15,069	58
18	5,021	24	54	21,677	86
19	5,776	50	55	29,123	91
20	7,068	51	56	40,566	69
21	11,918	15	57	11,552	44
22	16,914	94	58	35,163	56
23	6,140	04	59	25,512	52
24	4,872	68	60	9,031	15
25	4,362	85	61	27,390	56
26	6,154	51	62	20,888	05
27	7,254	86	63	21,421	54
28	6,249	96	64	21,207	43
29	20,523	13	65	5,726	00
30	63,488	33	66	20,192	90
31	11,610	38	67	17,327	39
32	6,957	83	68	14,575	89
33	18,563	99	69	23,841	98
34	8,623	69	70	37,343	38
35	4,446	37			
36	3,983	23			
				1,158,388	84
Add for 268 $\frac{439}{1000}$ feet lockage at \$500				134,219	50
do. dam at Dunning's Ferry				8,000	00

Total amount

\$1,300,608 34

Add 10 per cent.

130,060 83

Whole distance 70 miles

\$1,430,669 17

Average per mile

\$20,438 13

Signed,

H. G. SARGENT, *Engineer.*

No. 16.

Estimate of the proposed canal connecting the Schuylkill and the Delaware, on the plan of cutting down the summit to within 20 feet of low water.

From the summit to the Schuylkill, average cut, 3 feet, 6 inches, 12 chains—3105 cubic yards, at 8 cents,	\$ 248 40
From Do. to the Delaware, average cut, 7 feet, 39 chains—23,464 cubic yards, at 10 cents,	2340 40
Summit level, 15 feet, 3 inches, cut—335,235 yds. at 18 cents,	60842 30
Forty feet of lockage, at \$500 per foot,	20000 00
Two tide locks, at \$7000 each,	14000 00
Steam machinery, &c. for raising water,	12000 00

Total for 3 miles less 18 chains,	<u>\$108,931 10</u>
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Estimate of a thorough cut by the same route.

Average cut, 29 feet, 2 inches—1,208,450 cubic yards, at 30 cents,	\$ 362,535 00
Two tide locks, at \$7000 each,	14,000 00
	<u>376,535 00</u>

H. G. SARGENT, *Engineer.*

Dec. 15, 1827.

No. 17.

Albany, December 17, 1825.

DEAR SIR—

On examining the materials collected during the recent survey, made down the valley of French creek, from the southern termination of the feeder to Hays' forge dam, I find that more time will be required in collecting them than I had anticipated. As you, in your last communication, are peremptory in requiring a preliminary report previous to the 20th of this month. I can now only state, in brief, that a canal is practicable down the east side of French creek, from the southern end of the feeder to Hays' dam. The distance is 19.8 miles estimated to cost \$9000 per mile. Of this distance $1\frac{1}{2}$ miles, in detached places, will require a protection wall against the floods of French creek.

The whole fall, from the bottom of the feeder to the surface of the water in Hays' dam, is 94.75 feet, requiring 12 locks, which can be disposed of at convenient intervals. In addition to this, there will be required a dam and guard gates for the reception of Little Sugar creek, estimated to cost \$1200, and embankment and aqueduct for the passage of Big Sugar creek, estimated to cost \$2,900.

I regret that I am not able to present any report complete.—It will be forwarded early in the next month.—Mean time I hope the information above communicated may answer, at least partially, the views of the commissioners.

I am, dear sir, very respectfully, Yours, &c.

J. FERGUSON.

No. 18.

Comparative view of the several routes between the Ohio and Lake Erie, deduced from the survey of the last and present season.

The first route beginning at the mouth of the Kiskeminetas, and passing thence up the Allegheny to French creek, thence up French creek to the Waterford summit, is composed of the following parts.

	<i>Distance.</i>	<i>Lockage.</i>	<i>Cost.</i>
1. From mouth of Kiskeminetas to that of French creek, estimated by Judge Geddes in 1826, the price of lockage being reduced to \$150 per foot lift.	87 $\frac{1}{2}$ miles	235 feet	\$1,664,459
2. From the mouth of French creek, to the Conneaut outlet on that stream, as estimated by Mr. Ferguson this year, at \$9,009 per mile.	19 $\frac{1}{2}$	94.75	178,200

	<i>Distance.</i>	<i>Lockage.</i>	<i>Cost.</i>
3. From the Conneaut outlet up French creek to Bemis' mill, by estimate of Mr. Ferguson at contract prices.	9 miles	feet	\$80,758
4. From Bemis' mill, by Waterford to Erie, report of Mr. Whippo.	46	773	416,010
	<u>162$\frac{3}{10}$</u>	<u>1,102.75</u>	<u>2,339,427</u>

The lockage on the Allegheny, is here calculated at \$150 a foot.

The second route beginning at the mouth of the Kiskeminetas, and passing thence up the Allegheny to French creek, thence up French creek to the Conneaut outlet, thence up the outlet to the Conneaut summit, and thence across that summit by way of Elk creek to Erie harbor, is composed of the parts stated in the following table. The French creek feeder as now located, will be necessary to supply it with water, though it will form no part of the main canal.

	<i>Distance.</i>	<i>Lockage.</i>	<i>Cost.</i>
1. From the mouth of Kiskeminetas, to that of French creek, per estimate of Judge Geddes, 87 $\frac{1}{2}$ miles	87 $\frac{1}{2}$ miles	235 feet	\$1,664,459
2. From the mouth French creek to Conneaut outlet, per estimate of Mr. Ferguson.	19 $\frac{4}{5}$	94.75	178,200
3. From French creek feeder, as located by Major Douglass last year, of which 12 $\frac{1}{2}$ miles will be a part of the main canal. Whole estimate of Major Douglass to Conneaut summit.	19 $\frac{1}{2}$		231,820
4. From the Conneaut summit to Erie harbor, per estimate of Major Douglass this year, lockage being reduced to \$150 a foot.	47	507.5	569,894
	<u>166$\frac{4}{5}$</u>	<u>837.25</u>	<u>2,644,373</u>

The third route begins at Pittsburg, thence down the Ohio to Beaver, thence up to Beaver and Shenango to the Conneaut summit, thence across that summit by way of Elk creek to Erie harbor, and is composed as follows: The whole French creek feeder, located by Major Douglass last year, is necessary for this line, though it forms no part of the main canal. It is therefore taken into the aggregate of cost, though not of distance.

	<i>Distance.</i>	<i>Lockage.</i>	<i>Cost.</i>
1. From Pittsburg by Beaver and Shenango, to the Conneaut summit, per estimate of Mr. Whippo.	120½ miles	345 feet	\$928,301
2. French creek feeder by Maj. Douglass, estimate last year.			231,820
3. From Conneaut summit to Erie harbor, estimate of Major Douglass, lockage reduced to \$150 per foot lift.	47	507.5	569,894
	<u>167½</u>	<u>852.5</u>	<u>1,730,015</u>

The fourth route pursues the same line as the foregoing to Conneaut lake, thence it takes the course of the French creek feeder, as located by Major Douglass, as far as Bemis's mill, thence up French creek to Waterford, and across the Waterford summit to Erie harbor. The whole feeder becomes by this route a portion of the main canal. The parts are as follow:

	<i>Distance.</i>	<i>Lockage.</i>	<i>Cost.</i>
1. From Pittsburg to Conneaut lake, by Mr. Whippo's report,	120½ miles	345 feet	\$928,301
2. French creek feeder, as located by Major Douglass,	21½		231,820
3. From the feeder head at Bemis's mill, across the Waterford summit to Erie harbor, per Mr. Whippo,	46	773	416,010
	<u>186</u>	<u>1,118</u>	<u>1,576,131</u>

No. 19.

List of Superintendant Engineers and assistant Engineers, employed upon the surveys, under the direction of the canal commissioners, during the season of 1827, with the rate of wages allowed to each.

Joseph M'Ilvaine, superintendant of surveys, at 3 dollars per day.

John Wilson engineer, at 4 dollars a day—surveys through Chester and Lancaster.

David B. Douglass, engineer, at 4 dollars a day—Conneaut and Erie survey.

Charles T. Whippo, engineer, at 4 dollars a day—Beaver, Shennango and Waterford survey.

John Randal, jr. engineer, at 4 dollars a day—North Branch survey.

William Wilson, assistant engineer, at 2 dollars a day—West branch summit.

John Mitchell, assistant engineer, at 2 dollars a day—West branch summit.

George Haines, assistant engineer, at 60 dollars a month—employed under Major Wilson.

David Trueman, assistant engineer and surveyor, at 60 dollars a month, employed under Major Wilson—died in the service.

Anthony B. Johnson, assistant engineer and surveyor, at 60 dollars a month, employed under Major Wilson—succeeded Mr. Trueman.

Theophilus Brown, assistant engineer, at 60 dollars a month—employed under Major Douglass.

William C. Bryant, assistant engineer and surveyor, at 60 dollars a month—employed under Major Douglass.

Charles Potts, assistant engineer, at 60 dollars a month—employed under Mr. Whippo.

Robert Highlands, assistant engineer and surveyor, at 60 dollars a month—employed under Mr. Whippo.

John Bennet, assistant engineer, at 60 dollars a month—employed under Mr. Randal.

A list of chainmen, target men, axe men, &c. would have been added to the above, tho' not called for by the terms of the law, but that it cannot be made out until settlements take place with the several engineers—the selection of such persons being left to their discretion. The rate of wages allowed to target men, has been uniformly \$ 1,50 per day, and to axemen and chainmen, \$ 1, a day, except in Mr. Mitchell's survey where wages somewhat higher were paid, on his representation that hands could not be procured

at that rate. A wagoner has been allowed each party at \$2 50 a day. Where a boat has been used instead of a wagon; its expenses, not exceeding the hire of a wagoner, have been paid. Two persons have been employed for short periods, as clerks in copying documents annexed to the report of the board, namely, Andrew T. Smith of Philadelphia, and James Maginnis of Harrisburg, at two dollars a day while so engaged.

Series 10.

No. 1.

Statement shewing the probable cost of the several divisions of the Pennsylvania canal according to contract rates, the amount at which they were estimated, naming the engineer who made the estimate and explaining the cause of differences.

1 *Eastern Division.*

Original estimate of Wm. Strickland	\$ 405,511	
Estimate of the cost of increasing the size from Peter's mountain to Harrisburg	39,700	
	<hr/>	
	\$ 445,211	— \$ 445,211
Amount of work done on the line to December, 1827	335,894	
Amount necessary to complete	126,362	
	<hr/>	
	462,256	— 462,256
	<hr/>	
Excess of cost above estimated		\$ 17,045
The following works were not included in the original estimate, viz : 22 bridges	\$ 11,000	
Upper lock, not originally necessary but made so by alterations at the upper end	8,800	
Fencing	5,750	
	<hr/>	
	\$ 25,550	— 25,550
	<hr/>	
Real cost below estimate		\$ 8,505

2 *Western Division.*

1st Part. From Kiskiminetas to Pine creek	
Amount of whole cost	\$ 396,220
Estimate of N. S. Roberts	297,743
	<hr/>
Excess of cost above estimate	\$ 98,477

This difference is accounted for by the occurrence of hill slips and other unforeseen circumstances explained in the report of the acting commissioner and engineer.

2nd Part. From Pine creek to the Monongahela.

A variety of estimates have been made for this distance, upon many different routes, none of which correspond precisely with that adopted, so that an accurate comparison cannot be made.

It is stated generally that the contracts on this section and its final cost will fall below what was expected.

3 Kiskeminitas Division.

By the adoption of locks and dams on this division, a saving of about 90,000 dollars has been effected on that part which was estimated by Mr. Olmstead. The lower 12 miles were never estimated by any engineer, until put under contract. (See report of Alonzo Livermore, engineer.)

4 French Creek Feeder.

Cost of contract prices	80,758
Estimate of Major Douglass, 1826	79,697
Difference	\$ 1,051

5 Susquehanna Division.

Estimate of Judge Geddes, 1826	\$ 548,567
of Mr. Guilford at contract prices	441,350
Difference	\$ 92,783 ————— \$92,783

This difference is easily explained. The calculations of Judge Geddes were made for wooden locks, at \$ 1 50 per foot; those of Mr. Guilford are of wood and stone combined and the difference in the cost of locks is

The cost of replacing a road, not estimated by Judge Geddes, is	\$ 42,000
The dam at Shamokin ripples was omitted by Judge Geddes, as being likely to produce more than its cost	20,596
The additional bridges not estimated by Mr. Geddes are	27,000
	10,000
	\$ 99,596 ————— 99,596

Difference in favor of Mr. Guilford \$ 6,813

6 Junaita Division.

For a statement on this subject, see the report of James Clarke, Esq. superintendent, and the comparative statement therein referred to.

7 Delaware Division.

The part now under contract was estimated by Henry G. Sargeant, engineer, at	\$ 74,801
It will cost at contract prices	71,922
Difference	\$ 2,879

MINUTES

Of the board of Canal Commissioners of Pennsylvania, from January 31st, 1827, to December 25th, 1827, inclusive.

Harrisburg, January 31st, 1827.

7 P. M.—This being the time to which the board stood adjourned, Messrs. Scott, Enoch, Lacock and Mowry attended. A quorum not being present, adjourned to to-morrow morning at nine o'clock.

Harrisburg, February 1st, 1827.

9 A. M.—The board met.

Present, William Darlington, Esq. President, Messrs. Scott, Lacock, Montgomery, Mowry and Enoch.

The following reports of engineers were laid before the board.

1. A report on the survey and examination of a canal route from the mouth of the Juniata, up the Susquehanna, West branch and Sinnemaehoning, with drafts and estimates, by James Geddes, Esq.

2. A report on the survey and examination of a canal and portage line, from the mouth of Juniata to the mouth of Kiskeminetas, with drafts and estimates, by Canvass White, Esq.

3. A separate report by G. T. Olmsted, Esq. on that portion of the Juniata route confided to him in consequence of the sickness of Mr. White, with drafts and estimates.

4. A report on the survey and location of the French creek feeder, with a draft and estimate by Major D. B. Douglass.

5. A report on the survey of the north branch of the Susquehanna, from Northumberland to the New York line, with drafts and maps, by John Bennet, Esq.

Mr. Lacock, as acting commissioner for the Western Division, presented a report shewing the amount of work done, and of money expended on that division up to the first of January, 1827.

Mr. Mowry, as acting commissioner for the Eastern Division, presented a further report of contracts entered into by him up to the 31st January, 1827.

The president laid before the board, a communication from William Strickland, engineer, containing comparative estimate of the cost of executing the upper level of the Eastern Division, according to its present location, and according to the mode proposed by him at the last meeting of the board.

Resolved, That Messrs. Geddes, White, Strickland and Roberts, be requested to confer, and report to the board their opinions upon the present location of the upper level of the Eastern Division of the Pennsylvania canal, and upon the necessity of erecting a dam in the river Susquehanna at or near the mouth of Juniata, and

the effect which such dam may have upon the natural navigation of the stream.

The reading of reports from engineers was then commenced. At one o'clock, on motion, adjourned to meet at half past three this afternoon.

Harrisburg, February 1st, 1827.

Half past 3, P. M.—The board met.

Present as this morning.

Mr. Scott presented to the board, a report of his proceedings under the resolutions of March 10th and May 9th, last, authorising him to superintend the survey of a canal route from Northumberland to the New York line, together with remarks upon the said survey, and upon the advantages to be expected from the completion of the work.

The reading of reports from engineers, &c. was then resumed and continued till six o'clock, when the board adjourned to nine o'clock to-morrow morning.

Harrisburg, Feb. 2d, 1827.

9 A. M.—The board met.

Present as yesterday.

The president laid before the board a joint report of Messrs. Strickland, Geddes, White and Roberts, upon the location of the upper level of the Eastern Division, made in pursuance of yesterday's resolution.

The board proceeded to discuss the several subjects to be embraced in their report to the governor. Having freely compared their views and opinions.

Resolved, That the president be requested to prepare the sketch of a report to the governor, and to submit the same to the board at their meeting to-morrow morning.

Adjourned to ten o'clock, to-morrow morning.

Harrisburg, Feb. 3, 1827.

10 A. M.—The board met.

Present as yesterday.

The president laid before the board, the rough draft of a report to the governor, prepared in conformity to yesterday's resolution. The same having been read and fully discussed, and some alterations made, it was ordered to be transcribed and read again on Monday morning the 5th instant.

Resolved, That the location of the Eastern Division of the Pennsylvania canal as fixed by resolution of 19th June last, be altered by raising the upper level thereof to the necessary height, and continuing up the Susquehanna to a point at the upper reef of Foster's falls, near Clark's ferry, and that application be made to his excellency the governor, to consent to this alteration.

The president laid before the board, a resolution of the committee of the house of representatives, requesting the attendance of Messrs. Geddes, Strickland, White and Roberts, during such time

as the committee might be engaged in examining their reports and estimates.

It being ascertained that Mr. White had left Harrisburg,

Resolved, That the president take the necessary measures to secure the presence of the other gentlemen named by the committee, and that the compensation of Mr. Geddes continue at the same rate, while necessarily detained from this cause.

Resolved, That the President of the board be authorised at such time or times as he may think fit to request his excellency the governor, to draw his warrant or warrants in favor of the treasurer of the board, for such sum or sums not exceeding in the whole one hundred thousand dollars, as may appear to be wanted for the construction of the canal, to be placed with the treasurer of the board, subject to the order of the acting commissioners.

Adjourned to Monday the 5th instant, at 9 A. M.

Harrisburg, Feb. 5th, 1827.

9 A. M. The board met.

Present as at the last meeting.

The president laid before the board a copy of a report to the governor, as ordered to be transcribed at the last meeting. Some further alterations having been suggested and agreed to, it was ordered to be transcribed and read again on to-morrow morning.

A communication was received from the secretary of the commonwealth, announcing that his excellency the governor, had consented to the change in the location of the Eastern Division, as made by resolution of the third instant.

The following communication was received, and having been read, was laid on the table.

Harrisburg, Feb. 5, 1827.

To the Canal Commissioners of Pennsylvania.

GENTLEMEN,

On behalf of the select and common councils, and the citizens generally of the city of Pittsburg, we have the honor to submit to your consideration the following proposition. That you rescind the resolution passed in September last, in Philadelphia, suspending the work on the canal from Pine creek down to the city of Pittsburg, and that you extend the location upon the upper level as adopted by yourselves, and approved by the governor, through the city upon such line as you may think best into the Monongahela river. This extension to be expressly predicated upon the condition, that the amount of damages and the cost of extinguishing private rights, shall not exceed a certain sum to be limited by yourselves.

Upon the principle of this proposition, we believe our citizens to be very unanimous, and it removes the most prominent difficulty in relation to the continuation of the canal; and, as it places the

amount of damages within your own control, it also removes one of the causes which induced a reference of this subject to the legislature.

With respect, &c.

*William Wilkins,
James Riddle,
W. Forward,
H. Baldwin.*

Resolved, That in consideration of the services of the Secretary of this board, his salary be raised to one thousand dollars per annum, to commence from the fifth day of February last.

Adjourned to 10 o'clock, to-morrow morning.

Harrisburg, Feb. 6th, 1827.

10. A. M.—The Board met.

Present as at the last meeting.

The copy of a report to the governor, as ordered to be transcribed yesterday, was laid before the board, which having been read and unanimously agreed to,

Resolved, That the same be signed by the president and secretary, and delivered to the governor, in obedience to the eighth section of the act of April 11th, 1825.

Adjourned to 10 o'clock, to-morrow morning,

Harrisburg, Feb. 7th, 1827.

10. A. M.—The board met.

Present as at the last meeting.

The board proceeded to consider the propositions submitted to them by the committee on behalf of the select and common councils and citizens of Pittsburg.

Resolved, That the board adjourn to four o'clock, this afternoon, and that all persons interested in the questions now pending on the western division, be invited to attend at that hour.

Harrisburg, Feb. 7th, 1827.

4. P. M.—The board met.

Present as this morning.

Messrs. Wilkins, Forward, Riddle and Baldwin, attended on behalf of the councils and citizens of Pittsburg, Messrs. M'Donnel, Patterson and Robinson also attended.

The discussion of questions relating to the western division was commenced by the parties interested and continued until seven o'clock, when the board adjourned to to-morrow morning at 9 A. M.

Harrisburg, Feb. 8th, 1827.

9. A. M.—The board met.

Present as yesterday.

The gentlemen from Pittsburg and its vicinity, who were present yesterday, again attended.

The discussion of yesterday was renewed, and continued until 6. P. M. when the several gentlemen interested withdrew.

The following resolutions were then offered for consideration.

Resolved, That the board will continue the western division of the Pennsylvania canal, through the city of Pittsburg, either by a

route from Washington street between Penn and Liberty streets, to the Monongahela river, or by a route from the city line round the point of Grant's hill and along the east side of Smithfield street to the Monongahela near the bridge. Provided the damages to be paid for property on the former route do not exceed ten thousand dollars, or those on the latter five hundred dollars.

Resolved, That the engineer for that division, be instructed to ascertain and report to the board at their next meeting, the relative expense of erecting an aqueduct over the Allegheny at Pine creek at or near Hare's Island, and at Washington street, and to furnish at the same time an estimate for a continuation of the canal from Pine creek on the west side to the aqueduct scites, at Hare's Island and Washington street respectively.

Resolved, That if before the next meeting of the board, satisfactory assurance shall be given, that the liability of the commonwealth for damages, on either or both of the routes, shall not exceed the sum or sums assigned to them respectively, the board will proceed to erect an aqueduct across the Allegheny river, at such points, as on the report of the engineer may be preferred, and to continue the canal, from the east end of such aqueduct to the Monongahela, by one of the routes above described.

On motion of Mr. Enoch, it was resolved, that the question be taken on the foregoing resolutions separately, and by yeas and nays.

The question being taken on the first resolution, the yeas were Messrs. Darlington, Enoch, Montgomery and Mowry, 4—the nays were Messrs. Lacock and Scott. So the first resolution was agreed to.

On the second resolution, the yeas were Messrs. Darlington, Enoch, Montgomery, Mowry and Scott, 5—Nay, Mr. Lacock, 1. So the second resolution was agreed to.

On the third resolution, the yeas and nays were the same as on the second. So the third resolution was agreed to.

Resolved, That when the board adjourn, it adjourn to meet at Harrisburg on the 1st day of May next.

Resolved, That the president during the recess of the board, be authorised to correspond and make engagements with such engineers as is in his opinion may be necessary for the business of the coming season.

Resolved, That judge Scott be requested to procure the attendance of Mr. Bennet at Harrisburg, at such time during the present session as he may think proper, and that while so attending he be allowed the same rate of compensation as when actually engaged in the survey of the north branch.

Adjourned to meet at Harrisburg, on the first day of May next.

Harrisburg, May 1st, 1827, 6 P. M.

The Board met.

Present Wm. DARLINGTON Esq. President.

David Scott, Abner Lacock, John Phillips, George M. Dallas, Thomas Enoch, Charles Mowry, Esqrs.

A communication was read from the Secretary of the Commonwealth, enquiring at what time the money appropriated for the canals by the law of the last session, will be wanted.

Resolved, That the said communication be referred to the acting commissioners, with instructions to report thereon to-morrow morning.

A communication from a committee of the select and common councils of Pittsburg, together with resolutions of those bodies—and a letter from the Mayor of the city were read.

A communication from Messrs. Denny, Brown and others, members of the Legislature, was read. A communication from a number of members of the Legislature, asking that Messrs Wilson and Mitchell, may be employed to make further examinations, with a view to a water communication between the Susquehanna and Allegheny, was read.

Adjourned to to-morrow, at 9 A. M.

Harrisburg, May 2nd, 1827, 9 A. M.

The Board met. Present as yesterday.

The President made report, that under the authority conferred upon him by resolution of February last, he has corresponded with a number of engineers, with a view to their employment the present season. That on the 26th March, 1827, a letter was written by the Secretary of the board, under the directions of the President, to Judge Geddes, of which a copy is hereto annexed. That an answer was received from Judge Geddes dated April 1827, of which a copy is also annexed. That a second letter was written by the Secretary under the same authority, dated April 9th, of which a copy is also annexed. That an answer was received from Mr. Geddes, dated April 1827, of which a copy is also annexed. That in consequence of the request of the Secretary, contained in his second letter, Mr. Geddes is now in Harrisburg, and ready to engage upon the same terms, as during the last season.

That the secretary under the same authority, had a personal interview with Major Douglass on the 5th of April, and a distinct understanding that he would be employed during the present season, on the terms of his last year's engagement. That at the request of the Secretary, made at the same time, Maj. Douglass is now in Harrisburg, awaiting the pleasure of the board. That Mr. Guilford is also in Harrisburg at this time, in consequence of an invitation given him on the 30th April, and ready to engage if the board can offer him adequate inducements.

Mr. Mowry, acting commissioner for the eastern division, made a further report of contracts entered into by him, since the 31st January last.

Mr. Dallas offered the following resolutions:

Resolved, That the board do now appoint the following persons, to be principal engineers upon the terms of the act of Assembly, of 16th April last, viz: William Strickland, Nathan S. Roberts, James Geddes, David B. Douglass and Simeon Guilford, and that they be respectively assigned the following duties.

Judge Geddes to examine the North branch and Chester valley.
Mr. Roberts to locate to Blairsville.

Mr. Strickland to locate lines to Northumberland and Lewis-town.

Major Douglass to locate the French creek feeder, and make the Allegheny and Lake Erie surveys.

Mr. Guilford to attend to the Delaware line.

Resolved, That a letter be immediately addressed to each of the above named engineers, apprising him of his appointment by this board, and referring to the terms, upon which, agreeably to the act of the 16th April last, the board are authorized to engage his services.

The yeas and nays being called separately on these resolutions; on the first the yeas were Messrs Darlington, Dallas, Enoch, Lacock, Mowry, Phillips, Scott. Nays none. So the first resolution was agreed to.

On the second resolution, the yeas were Messrs Darlington, Dallas, Enoch, Lacock, Mowry, Phillips, Scott. Nays none. So the second resolution was agreed to.

Messrs. Lacock and Mowry, to whom was yesterday referred the letter of the Secretary of the Commonwealth, reported as follows:

It is found upon calculation, that there will be wanted in addition to the funds now remaining of the three hundred thousand dollars loan, to defray the expense of the works now in progress, at least one hundred and sixty thousand dollars, viz: Eighty thousand dollars on the first day of June, and eighty thousand dollars on the first day of July next.

Resolved unanimously, That the President of the board make a reply, to so much of the letter received from the Secretary of the Commonwealth yesterday, as relates to "the further sums of money required for the two sections of the canal now under contract, before the general loan could be advantageously negotiated," founded upon the joint report just made by the two acting commissioners.

On motion, that the board do now adjourn to 3 P. M. the yeas were Messrs Darlington, Dallas, Enoch, Lacock, Mowry Phillips.—6. Nay Mr. Scott. So the board adjourned to 3 P. M.

Harrisburg, 2nd May, 1827, 3 P. M.

The board met. Present as this morning.

Letters from Messrs Strickland, Roberts, Geddes and Douglass, declining—and from Mr. Guilford, accepting the appointment made by resolution of this morning, were read.

Mr. Dallas offered the following.

Resolved, That the letters received from the Engineers, declining the appointments made by the board this morning, be referred to a committee, who shall take the subject into consideration, and report what measures it may be in the power of the board to take, to

wards the execution of the canals, and the examination of canal routes, directed by the recent act of assembly.

The yeas and nays being called for on this resolution, those voting in the affirmative were Messrs Darlington, Dallas, Enoch, Lacock, Mowry, Phillips, Scott. Nays none. So the resolution was agreed to. Messrs Darlington, Dallas, Scott and Enoch, were named as the committee.

Mr. Dallas offered the following resolution :

Whereas, a request has been made by H. Petrikin and fourteen others, members of the Legislature, that Messrs. Mitchell and Wilson may be employed during the present season, in making further examinations, with a view to a continued water communication between the Susquehanna and Allegheny :—

Resolved, That the Board cheerfully accede to such request, and that Messrs. Mitchell and Wilson be employed accordingly.

Resolved, That the Secretary be directed to give notice of their appointment to Messrs. Wilson, and Mitchell and respectfully to refer them to the late act of assembly, for the terms upon which the Board is authorised to engage their services.

The question being taken on these resolutions, Messrs. Dallas, Darlington, Enoch, Lacock, Mowry, Phillips and Scott, voted in the affirmative.

So these resolutions were unanimously agreed to.

On motion that the Board adjourn to to-morrow, at 9 A. M. all the members present voted in the affirmative.

Adjourned to to-morrow at 9 o'clock A. M.

Harrisburg, May 3rd, 1827.

9 A. M.—Present as yesterday.

Mr. Dallas, from the committee to whom were yesterday referred the letters received from the engineers with instructions to report what measures it might be in the power of the Board to take towards the execution of the canals and the examination of canal routes directed by the recent act of assembly, submitted the following report and resolutions :

That the last act of the Legislature respecting the Pennsylvania canal, passed on the 16th of April, altering the rates of compensation to engineers and prescribing the duty of an *exclusive* attention to the work, threatens at this critical period to be greatly embarrassing and injurious.

The decided, though respectful manner in which every experienced engineer, within the reach of the Board, with the single exception of Mr. Guilford, have declined their appointment under the conditions imposed, is calculated to awaken the most painful anxiety for the present welfare and future progress of the noble structure confided to the management of the commissioners. It is impossible to avoid feeling oppressed by the weight of responsibility thus thrown upon us; and though fixed in the determination at all hazards, not to exceed the limits within which it has plea-

sed the Legislature to confine our discretion, we cannot but be sensible that as agents of the Commonwealth and friends to its internal improvement, we are bound to make every legal effort to rescue the vast undertaking from its present jeopardy; to prevent the least retrograde movement which, in a project so immense and so peculiarly situated, would be fatal; and at all events, if we can do no more, to preserve what has already been achieved, until the representatives of the people, fresh with the sentiments of their constituents, shall reconsider the subject and decide its destiny.

Impressed with these views, the committee submit for adoption the plan of operations, for the ensuing season, marked out in the subjoined resolutions. They are conscious that it is imperfect and partially hazardous:—Its defects and dangers, however, are beyond the reach of remedy, for their source is in the late act of assembly; and it is believed they are as few as can be presented by any scheme now within the competency of the board to execute.

Resolved, That Mr. Guilford be requested to undertake the location and execution of a line of canal, up the valley of the Susquehanna, from the eastern division of the Pennsylvania canal to a point at or near the town of Northumberland; and if he consent to this arrangement, that he be instructed, as soon as possible, to examine both sides of the Susquehanna, between those points, and to report the most advantageous location, together with his opinion as to the best mode of crossing the river, if it be necessary.

Resolved, That Mr. Roberts be requested to locate and prepare for contract as soon as possible, a line of canal, from the western section of the Pennsylvania canal up the valley of the Kiskiminetas and Connemaugh to a point at or near Blairsville, or as much thereof as it may be practicable for him to execute, while he remains in the service of the board, and to report the same for confirmation.

Resolved, That Francis W. Rawle, James D. Harris, and Alonzo Livermore, be appointed engineers in the service of the board, at the rate of \$1460 a year, and that the following duties be assigned them:—

Mr. Rawle, with the voluntary aid of Mr. Strickland, (as tendered in his letter of resignation,) to superintend the eastern division, as at present under contract; Mr. Harris to superintend the western division as at present under contract and Mr. Livermore to accompany Mr. Roberts in the location of the line to Blairsville.

Resolved, That the services of major Douglass be engaged, if possible, for a portion of the season, and that his attention be directed to the line between the Allegheny and Lake Erie.

Judge Scott, from the same committee, offered as a substitute the following report and resolution:—

That, with the view of seasonably securing the services of a competent number of well qualified and experienced engineers, the board, at their last meeting in February, authorized their president to institute the requisite inquiry, and enter into engagements during the recess of the board. This duty was, very properly, im-

posed upon the secretary of the board by the president, because his local residence afforded greater facilities for direct and immediate communication with the different parts of the country. The secretary immediately commenced the inquiry, and prosecuted it with the utmost diligence, both by letter and personal application, during the recess of the board. The result is, that but five gentlemen can be found possessing the requisite qualifications for principal engineers, and free from other engagements, whose services can be obtained on any terms. These are Messrs. Strickland and Roberts, now in the service of the board, and Messrs. Geddes, Douglass, and Guilford, all of whom decline absolutely to engage at the rates fixed by the law of the last session of the legislature—the only terms the board can now offer.

The letters referred to your committee were written in answer to a communication from the board, announcing their appointment as principal engineers, with a reference to the act above referred to, limiting the amount of their annual or daily pay. The communication of the board might be construed, by the gentlemen to whom it was addressed, as having been made upon the assumption that no pre-contracts subsisted between them and the board; or, as an intimation to the gentlemen who were under such pre-contracts, that their services were no longer required under them. The latter construction, it is presumed, was given by these gentlemen, and hence they decline to engage upon the terms proposed.

In referring to the terms of the original agreements between the board and Messrs. Strickland and Roberts, it appears that they were respectively engaged by the year, or during the pleasure of the board. The first year of Mr. Strickland's engagement expired in March, and the first of Mr. Roberts' also in March, or at furthest on the 5th day of April last. Both these gentlemen have continued in the service of the board up to the present time, and have been actively engaged in prosecuting the works entrusted to their superintendence; and it is confidently affirmed that it never was contemplated by the board, nor by either of these gentlemen, to rescind the original agreement, but on the contrary, it was the expectation and understanding of all concerned, that they should continue in the service of the board, and be subjected to their directions as to their stations and duties, for another year, upon the terms of their original agreements.

With respect to Messrs. Geddes and Douglass, your committee are clearly of the opinion that the offers of employment made to them by the board, through their secretary, upon the terms on which they were engaged last season, their acceptance of those terms, and their actual attendance upon the board, awaiting their instructions, should, upon every principle of honour, honesty and fair dealing, be construed into an agreement, which neither has now the liberty alone to rescind.

In examining the act of the legislature (passed at the last session) above referred to, your committee are pleased to find that

ample provision has been made for carrying into effect the engagements of the board with their engineers. So far from intending to impair the validity of such agreements, the legislature have expressly provided for their execution.

As it has been ascertained by the board that no other competent engineers can be found to engage in the service of the board this season, as these gentlemen have declined accepting the terms offered by the act of assembly, and as a failure to prosecute the works this season, or the submitting their superintendence to incompetent and inexperienced men, must inevitably subject the commonwealth to increased expense, and the works themselves to great hazard, your committee are firmly persuaded that the public interest, the public honor, and the reputation of the board, imperiously require that the above named engineers should be continued in the service of the board, upon the terms of their engagements before the passage of the law above referred to, and by thus faithfully fulfilling their engagements with their engineers, the board will be enabled vigorously to prosecute the great public works authorised by the legislature. The committee therefore submit the following resolution:

Resolved, That under the contracts entered into before the passage of the act of the last session of the legislature, limiting the pay of Engineers, with Messrs. Strickland, Roberts, Geddes and Douglass, they be continued in the service of the board, and that the assignment of their stations and duties be referred to a committee.

On motion, the said reports and resolutions were laid on the table.

Mr. Dallas submitted the following preamble and resolutions.

Whereas Judge Geddes and Major Douglass, engineers heretofore employed by the board, have agreeably to the authority conferred upon the president at the session in February last, been engaged to attend at the present session, and have actually left their homes and attended in person, with the expectation of being re-engaged. Be it therefore *Resolved*, That these two gentlemen be paid for the period which elapses between their leaving their respective homes, and their return thereto, at the rate of compensation heretofore allowed them, together with their personal expenses.

The resolution being under discussion, Mr. Scott moved to postpone it for the purpose of introducing the following:

Resolved, That Judge Geddes and Major Douglass be continued in the service of the board, upon the terms of their engagements entered into prior to the passage of the law fixing the compensation of engineers, and that the assignment of their respective stations and duties, be referred to the committee upon the organization of the engineer corps.

Mr. Lacock then moved that the whole subject be postponed for the present.

The names of members being called on this motion, those voting in the affirmative were, Messrs. Phillips, Lacock, Scott and Mowry, 4. In the negative, Messrs. Enoch, Dallas and Darlington. So the resolution and substitute were postponed.

On motion that the board do now adjourn to 3 P. M. all the members present voted in the affirmative.

Adjourned to 3 P. M.

Harrisburg, May 3d, 1827:

3 P. M.—Board met.

Present as this morning.

Mr. Mowry offered the following resolution:

Resolved, That the account of William Strickland, this day presented, for his personal expenses, from the 10th of January up to the present time, amounting to seventy-five dollars, be allowed and paid.

The resolution being before the board, Mr. Scott moved to postpone, for the purpose of introducing the following:

Resolved, That William Strickland, Nathan S. Roberts, James Geddes and Major Douglass, be continued in the service of the board upon the terms of their respective agreements with the board prior to the passage of the law, fixing the compensation of engineers, and that the assignment of their stations and duties, be referred to a committee.

On the question of postponement the yeas were Messrs. Mowry, Scott, Lacock and Phillips, 4. The nays, Messrs. Darlington, Dallas and Enoch. So the resolution offered by Mr. Mowry was postponed.

On the question of adopting the substitute offered by Mr. Scott, the yeas were Messrs. Mowry, Scott, Lacock and Phillips. The nays Messrs. Darlington, Dallas and Enoch. So the substitute was agreed to.

The following resolution was offered by Mr. Dallas:

Resolved, That Joseph M'Ilvaine, Esq. be appointed a superintendant of the examination of canal routes, under the third section of the act of the 16th of April, 1827, and that it be his duty,

1st. To examine, adjust and settle all accounts connected with the examination of canal routes.

2d. To correspond with all persons engaged or employed in the examination of canal routes, conveying to them such instructions as may be directed or authorised by the board.

3d. To proceed occasionally as circumstances may require, to the various canal routes, in order to examine the progress and organization of the parties engaged.

4th. To keep the board by detailed and frequent reports, well acquainted with the situation, proceedings and prospects of the parties engaged on the various canal routes.

5th. And in general to act between the board and the persons employed by them, in the examination of canal routes, so as to en-

pure activity of operation, strict responsibility and correct information.

On the question, shall this resolution be adopted? the yeas were Messrs. Darlington, Dallas, Enoch, Lacock, Mowry, Phillips and Scott. The nays none. So this resolution was agreed to.

Mr. Scott offered the following:

Resolved, That a committee be appointed to give to the respective engineers notice of the resolution adopted by the board, continuing them in the service of the commonwealth, and to ascertain whether immediate measures cannot be taken to proceed in execution of the works designated by the acts of assembly.

On the question, shall this resolution be adopted? the yeas were Messrs. Mowry, Scott, Lacock, Darlington, Phillips, Dallas, 6. Nay Mr. Enoch, 1. So the resolution was agreed to.

Messrs. Scott, Lacock and Mowry were appointed to compose the committee.

On motion, that the board do now adjourn to nine o'clock to-morrow morning, the yeas were Messrs. Mowry, Scott, Lacock, Darlington, Dallas, Enoch, 6. Nay, Mr. Phillips.

Adjourned to 9 A. M. to-morrow.

Harrisburg, May 4th, 1827.

9. A. M.—Present Wm. Darlington, Esq. President, Messrs. Scott, Lacock, Dallas, Mowry, Montgomery, Enoch, Phillips.

The resignation of Wm. Darlington, Esq. as president of the board, was read and accepted.

On motion, *Resolved*, That the board proceed to the election of a president by ballot, and that a majority of the whole number present be necessary to a choice.

On counting the votes it appeared that David Scott, Esq. was duly elected.

The committee appointed yesterday to give notice to the respective engineers of the decision of the board, reported:

That they have performed that service, and that the gentlemen have severally promised to give to the board a definite answer upon the subject, sometime during the day.

Mr. Lacock offered the following resolution,

Resolved, That the question yesterday determined, adopting the substituted resolution of Judge Scott, respecting the engineers be re-considered.

On the question of reconsideration, the yeas were Messrs. Darlington, Mowry, Enoch, Lacock, Dallas, Phillips, Scott, 7. Mr. Montgomery not having been present yesterday, declined voting. So the motion to reconsider prevailed.

Mr. Mowry then withdrew his resolution offered yesterday, relating to the accounts of Mr. Strickland.

The report of the committee to whom was referred the letters received from the engineers, and the resolutions thereto annexed, were then taken up anew for consideration.

Mr. Scott moved for a postponement of the resolutions, with a view to introduce the resolutions annexed to the report, offered by him as a substitute yesterday.

On the question of postponement, the yeas were Messrs. Mowry, Lacock, Phillips and Scott. The nays were Messrs. Darlington, Dallas, Enoch, and Montgomery, 4. So the motion to postpone was lost.

The question then recurred on the resolutions attached to the report of the committee, in the following words:

Resolved, That Mr. Guilford, be requested to undertake the location and execution of a line of canal up the valley of the Susquehanna from the eastern division of the Pennsylvania canal, to a point at or near the town of Northumberland, and if he consent to this arrangement, that he be instructed as soon as possible to examine both sides of the Susquehanna between those points, and to report the most advantageous location, together with his opinion as to the best mode of crossing the river if it be necessary.

Resolved, That Mr. Roberts be requested to locate and prepare for contracts as soon as possible, a line of canal from the western section of the Pennsylvania canal, up the valleys of the Kiskiminetas and Conemaugh to a point at or near Blairsville, or as much thereof as it may be practicable for him to execute while he remains in the service of the board, and to report the same for confirmation.

Resolved, That Francis W. Rawle, James D. Harris, and Alonzo Livermore, be appointed engineers in the service of the board, at the rate of \$1,460 a year, and that the following duty be assigned them.

Mr. Rawle with the voluntary aid of Mr. Strickland, as tendered in his letter of resignation, to superintend the eastern division as at present under contract. Mr. Harris to superintend the western division as at present under contract, and Mr. Livermore to accompany Mr. Roberts in the location of the line to Blairsville.

Resolved, That the services of Major Douglass be engaged if possible, for a portion of the season, and that his attention be directed to the line between the Allegheny and lake Erie.

On the first resolution, the yeas were Messrs. Montgomery, Dallas, Lacock, Mowry, Enoch, Phillips, Scott, 7. So the first resolution was agreed to.

On the second resolution, the vote was the same as on the first. So the second resolution was agreed to.

On the third resolution, the yeas were Messrs. Montgomery, Dallas, Lacock, Mowry, Enoch, Phillips, 6—nay Mr. Scott. So the resolution was agreed to.

On the fourth resolution, the yeas were Messrs. Montgomery, Dallas, Lacock, Mowry, Enoch, Phillips and Scott. So the fourth resolution was agreed to.

The question being taken on the adoption of the preamble, Messrs. Montgomery, Dallas, Lacock Mowry, Enoch and Phillips

voted in the affirmative; Mr. Scott in the negative. So the preamble was agreed to.

The following resolution postponed yesterday, again came up for consideration.

Whereas, Judge Geddes and Major Douglass, engineers, heretofore employed by the board, have agreeably to the authority conferred upon the president at the session in February last, been engaged to attend at the present session, and have actually left their homes and attended in person with the expectation of being re-engaged.

Be it therefore, Resolved, That these two gentlemen be paid for the period which elapses between their leaving their respective homes and their return thereto, at the rate of compensation heretofore allowed them, together with personal expenses.

On the question, shall this resolution be agreed to? the yeas were Messrs. Dallas, Enoch, Lacock, Mowry, Montgomery, Phillips, 6—Nay Mr. Scott, 1. So the resolution was adopted.

It being moved that the board do now adjourn to 3 P. M. all the members present voted in the affirmative.

Adjourned to 3 P. M.

Harrisburg, May 4th, 1827.

3. P. M. The board met.

Present David Scott, Esq. president, Messrs. Montgomery, Lacock, Dallas, Enoch, Phillips, Mowry.

A communication from Messrs. Riddle and Lowry a committee appointed by the corporation of Pittsburg, requesting to be heard on the subject of the final location of the western division of the Pennsylvania canal, was read.

Resolved unanimously, That the secretary be requested to communicate to Messrs. Riddle and Lowry, the deputation from Pittsburg, that the board will be pleased to see and hear them, to-morrow morning at 9 o'clock.

Resolved unanimously, That the president, Mr. Dallas and Mr. Montgomery, be a committee to consider and report, how many and who should be appointed to procure releases on the routes of the canal, agreeably to the 10th section of the act of 9th April, 1827.

Resolved unanimously, That the president request his excellency the governor, to draw his warrant on the treasurer of the commonwealth, in favor of the board for the sum of five thousand dollars, to be applied to the purposes of the surveys about to be made under the act entitled An act to appoint a board of canal commissioners.

Resolved unanimously, That the payments made by the acting commissioner on the eastern division of the Pennsylvania canal, viz:

To George Parson for deduction of rent of his lot on account of making the canal through it,	\$21 25
To Abraham M'Clure for stoppage of his mill 22 days,	100
To W. B. Galbraith for injury done to his grass crop by throwing meadow lot open to make canal through it,	12 50
To John Buffington for the destruction of a stable and removing the same, with cider press, &c.	30
Do for removing 184 pannel of fence, and injury done to crop,	20
To Amos Grist for removing P. Keller's stable,	15
To Henry Beader for 80 feet of copper pipe,	27
To Ziegler and Lingle for removing the board fence about their board yard and occupying of same,	75

\$300 75

Be approved and confirmed.

Mr. Dallas offered the following for consideration:

Whereas, the acting commissioner on the eastern division of the Pennsylvania canal entered into an agreement with George Parson, subject to the approbation of the board, to purchase for the use of the state certain lots of ground through which the canal passes, for two thousand dollars, and whereas in the opinion of the board, the price is too high, considering the amount already paid for temporary damages, viz: \$225 for a barn and \$21 50 for destruction of crops.

Therefore Resolved, That the board disapprove of the said contract—but that the said acting commissioner be authorised to offer the said George Parson, the sum of seventeen hundred and fifty-four dollars and fifty cents for said lots, and that he be also authorised to pay the same, on the completion of a clear title to the commonwealth.

On the question, shall this resolution be agreed to, the yeas were Messrs. Dallas, Enoch, Lacock, Montgomery, Mowry, Phillips, Scott, 7. Nays none. So this resolution was agreed to.

Mr. Dallas offered the following for consideration.

Resolved, That the contract entered into by the acting commissioner, on the eastern division of the Pennsylvania canal, with Peter Brenner for a certain lot of ground, of seven acres of land, in Swatara township, through which the said canal passes, and for the land taken by the canal passing through another lot in the same township, subject to the approbation of said board, for seven hundred and seventy-five dollars be disagreed to; and that the said acting commissioner be authorised to pay the said Peter Brenner six hundred dollars, whenever he shall make a clear title to the same.

On the question, shall this resolution be agreed to, Messrs Dallas, Enoch, Lacock, Montgomery, Mowry, Phillips and Scott, be-

ing all the members present, voted in the affirmative. So the resolution was adopted.

On motion to adjourn to 9 o'clock to-morrow morning, Messrs Dallas, Enoch, Lacock, Mowry, and Scott, voted in the affirmative. Messrs Montgomery and Phillips, in the negative.

Adjourned to 9 o'clock A. M. to morrow.

Harrisburg, May 5, 1827, 9 A. M.

The board met. Present as yesterday.

A letter from Mr. M'Donald of Pittsburg, requesting to be heard before the board, was read.

On motion of Mr. Dallas.

Resolved unanimously, That Mr. John M'Donald be informed by the secretary, that the board accede to his request, and will with pleasure, see and hear him as soon as he can conveniently attend.

The committee to whom was referred the subject of releases, by a resolution of yesterday, made report

That they have had the subject under consideration, and recommend the adoption of the following resolutions.

Resolved, That the secretary and Mr. Dallas, be authorized to employ an agent to procure releases, along the route from Carpenter's point to Philadelphia. That General Phillips employ an agent to procure releases upon the routes from the Allegheny river to lake Erie. That General Montgomery and Mr. Scott, be authorised to employ an agent or agents, to procure releases upon the North branch of Susquehanna, and that the said agent or agents be allowed a sum not exceeding \$1 50 per day, for their services.

Resolved, That the above named members of the board, supply the agents employed, with necessary blanks, and give them the necessary instructions.

On the question, shall the resolutions reported by the committee be agreed to, Messrs Montgomery, Lacock, Dallas, Phillips, Enoch, Mowry and Scott, voted in the affirmative.

So these resolutions were unanimously adopted.

Messrs Riddle, Lowry and M'Donald, of Pittsburg, then appeared and were heard.

On motion of Mr. Scott,

Resolved unanimously, That the whole subject relative to the location of the western division of the Pennsylvania canal, be referred to a committee.

Messrs Dallas, Montgomery and Phillips, were named as that committee.

Resolved unanimously, That the thanks of the board be tendered to William Darlington, Esq. for the ability and public spirit with which he has performed the duties of president, and for the gentlemanly deportment which has marked his intercourse with the members.

On motion to adjourn to 3 o'clock this afternoon, all the members present voted in the affirmative.

Adjourned to this afternoon at 3 o'clock.

Harrisburg, May 5, 1827, 8 P. M.

Board met. Present as this morning.

Mr. Dallas, from the committee appointed this morning, made the following report.

The committee appointed this morning, respecting the location of the western division, respectfully report, that after taking the subject into serious consideration, they are of opinion notwithstanding the conflict of sentiments heretofore exhibited before the board, that the most expedient course, is to adhere to the resolution adopted on the 9th August last, when the commissioners were at Pittsburgh, and had personal opportunities to obtain the best information, and to satisfy their judgments. Therefore,

Resolved, That the acting commissioner on the western section, be instructed as soon as practicable, in conformity with law, to put under contract so much of the canal as was located by an aqueduct across the Allegheny, above Pine creek, and thence to the eastern line of the city of Pittsburgh, conformably to the resolution of the board, of the 9th of August last.

Resolved, That the further location of the western section be deferred for the consideration of the board, at their next meeting.

Mr. Lacock moved that the consideration of this subject be postponed until Monday morning, the 7th instant, and that the board do now adjourn.

The question being taken, all the members present voted in the affirmative. So the motion prevailed.

Adjourned to the 7th instant, at 9 A. M.

Harrisburg, May 7th, 1827, 9 A. M.

The board met.

Present David Scott, Esq. president, Messrs Lacock, Mowry, Enoch, Montgomery, Phillips and Dallas.

Mr. Dallas submitted the following preamble and resolutions.

Whereas certain persons have been employed by the engineers, on the eastern and western divisions of the Pennsylvania canal, respectively, as assistants—and whereas such persons were so employed, under instructions from the President of the board; and at the rates of wages fixed by him.—And whereas such instructions were deemed to be within the general scope of the President's authority, but are not satisfactory to the accounting officers of the commonwealth.—Therefore resolved, that the authority of the President to give such instructions, and to fix the rate of wages as aforesaid, be and the same is hereby confirmed.

Resolved, That the payment by the acting commissioner of the eastern division of \$106 50 to Samuel H. Kneass, of \$340 to George Merrick, of \$290 00 to William B. Norris, of \$22 50 to Emerson M'Ilvaine, of \$267 to Robert Faries, of \$250 to Charles Schlatter, of \$284 to William Rorigue, of \$164 95 to sundry hands employed by William Strickland, of \$92 04 to sundry hands employed by Francis W. Rawle, of \$66 to Walter Bell,

axeman, and of \$15 to William M'Nelly, axeman, prior to the 5th day of February 1827, as contained in the account of the said acting commissioner, rendered on that day, and the rates of wages at which such payments were made, be and the same are hereby confirmed.

Resolved, That Samuel H. Kneass, George Merrick, William B. Norris and Emerson M'Ilvaine, be allowed respectively, one dollar and fifty cents a day; and the said Robert Faries, Charles L. Schlatter and William Rodrigue, each one dollar a day, from the dates to which by the said account of the said acting commissioner, they appear to have been paid, until the present time.

Resolved, That the item of \$29 66 for expenses, paid by William B. Norris, of \$131 50 paid to Thomas Wallace, of \$15 paid to John L. Ayres, and of \$5 paid Thomas Wallace for boarding axemen, of \$10 75 paid by Wm. Rodrigue, for sundries, and of \$4 87 paid J. W. Kane for cleaning office; all of which are contained in the acting commissioner's account, rendered as aforesaid, be and the same are hereby confirmed and allowed as part of the necessary expenses of laying out and conducting the said eastern division.

Resolved, That the employment of Samuel Douglass and George Fisher, Esqs. as counsel to attend to suits brought for damages occasioned by the canal, was in conformity with the advice and instructions of the President during the recess of the board, and that such employment and the payment to them of \$400, by the acting commissioner of the eastern division, be and the same is hereby confirmed.

Resolved, That the purchase of copper pipe and the laying of the same, for conveying water under the bed of the canal to Boyer's tavern, by the acting commissioner of the eastern division, be and the same is hereby confirmed.

Resolved, That the payment by the acting commissioner of the eastern division, of \$23 50 to A. Grist, for taking down and rebuilding a stable, be and the same is hereby confirmed.

Resolved, That the sum of \$460 55, be allowed to William Strickland, for personal and other expenses, up to the 10th February, 1827, and the sum of \$60 from that time to the 17th April, 1827; and that the sum of \$25 expended by him for materials, &c. as stated in his account of the 1st May, be also allowed.

Resolved, That the sum of \$441 be allowed to Francis W. Rawle, for personal and other expenses, up to the 31st January, 1827.

Resolved, That the appointment of William Groves, as superintendent of stone work, made in conformity with the resolution of the 10th June last, at the rate of \$1200 a year, be and the same is hereby confirmed,

Resolved, That the payment, by the acting commissioner of the western division, of \$378 dollars to George S. Rhine, of \$1 50, to P. T. Brennon, of \$22 1½ to Thomas Nell, of \$36 to Charles

Divine, of \$4 to S. R. Roberts, of \$28 to Charles Sayer, of \$36 to Dennis Scully, of \$177 to Emerson M'Ilvaine, of \$18 to Chas. Noyer, of \$114 50, to John Kelley, of \$176 to William B. Foster, Jr. of \$119 20, to A. E. Lacock, of \$192 54, to Andrew D. Harris, of \$2 to Charles Divine, of \$56 10, to A. E. Lacock, of \$85 15, to Andrew D. Harris, of \$80 to John Kelley, of \$11 56, to William Sheely, of \$1 to Edward O'Donnell, of \$4 to Moses Cane, of \$6 to Charles Divine, of \$4 to George Trucks, of \$82 to William Sheely, and of \$2 to Joseph M'Carrell, prior to the 5th day of February, 1827, as contained in the account of the said acting commissioner, rendered on that day; and the rates of wages at which such payments were made, be and the same are hereby confirmed.

Resolved, That the sum of \$252 95, paid by Abner Lacock, acting commissioner, to Nathan S. Roberts, and the sum of \$98 45² paid by him to James D. Harris, for their personal and other expenses, as included in his account of the 5th of February last, be and the same are hereby confirmed.

Resolved, That the payment of \$99 22¹/₂, to George Rhine, for his personal and other expenses, while in the service of the board, be and the same is hereby confirmed.

Resolved, That the engineer for the western division, with the consent of the acting commissioner, be authorised to employ a suitable person as superintendent of stone work, at the rate of wages not exceeding \$3 per day.

On the question—shall the preamble and resolutions be agreed to?—all the members present as above stated, voted in the affirmative. So the preamble and resolutions were agreed to.

Resolved unanimously, That the president be authorised to request his Excellency, the Governor, to draw his warrant or warrants, in favour of the treasurer of the board, for such sum or sums, not exceeding in the whole, one hundred and sixty thousand dollars, as may appear to be wanted for the construction of the canal, to be placed with the treasurer of the board, subject to the order of the acting commissioners.

The board resumed the subject of the location of the western division.

Mr. Dallas, from the committee appointed on the 5th instant, laid before the board a preamble, setting forth, at length, the reasons of the committee for offering the resolutions reported by them. The following resolution reported by the committee, then came up for consideration:

Resolved, That the acting commissioner on the western section, be instructed, as soon as practicable in conformity with law, to put under contract so much of the canal as was located by an aqueduct across the Allegheny, above Pine creek, and thence to the eastern line of the city of Pittsburg, conformably to the resolution of the board, of the 9th of August last.

Mr. Lacock moved to postpone, for the purpose of introducing the following:

Resolved, That the acting commissioner for the western division of the Pennsylvania canal, as soon as legal notice can be given, be instructed to put under contract, that part of the line of the canal that lies between section No. 92, as now completed above the mouth of Pine creek, so that it should terminate in the Allegheny river, on the west side, at a point below the bridge.— That a convenient basin be constructed in a proper situation near its termination, and another basin at the mouth of Saw-mill run: and it is directed, that at this basin a communication be made with the river by two locks of 11 feet lift each, agreeably to the plan proposed and profile exhibited, by N. S. Roberts, the engineer.

On the question of postponement, Mr. Lacock voted in the affirmative; Messrs. Montgomery, Scott, Mowry, Enoch, Dallas, and Phillips, in the negative. So the motion to postpone, was lost.

The question then recurring on the resolution as reported, Messrs. Dallas, Phillips, and Enoch, voted in the affirmative; and Messrs. Montgomery, Lacock, Scott, and Mowry, in the negative. So the resolution was rejected.

Mr. Dallas then offered the following resolution:

Resolved, That the acting commissioner of the western division, proceed to put under contract, as soon as practicable by law, the high level location of the canal, on the western side of the Allegheny river, from the extreme point near Pine creek to a point opposite, or nearly opposite Washington-street, and thence by an aqueduct, to the eastern line of the city of Pittsburg.

On motion of Mr. Mowry, the question on this resolution was divided, so as to end with the words "Washington-street."

On the first part of the resolution, Messrs. Lacock, Montgomery, Dallas, Mowry, and Scott, voted in the affirmative; Messrs. Enoch, and Phillips, in the negative. So the first part of the resolution was agreed to.

On the second part, Messrs. Montgomery, Dallas, Phillips, Enoch, and Scott, voted in the affirmative; Messrs. Lacock, and Mowry, in the negative. So the whole resolution was agreed to.

Mr. Dallas offered the following preamble and resolution:

Whereas, At their meeting in February last, the board determined to terminate the Pennsylvania canal in the Monongahela river, and it being now ascertained that such a termination cannot be made but by a tunnel through Grant's hill, and this being a work that will require much time and labour, should be commenced as early as possible. Therefore,

Resolved, That as soon as legal notice can be given, the acting commissioner be directed to put under contract a tunnel through Grant's hill, and from thence by a canal and locks, terminate the canal in the Monongahela river, at the mouth of Suke's run, agreeably to the location of N. S. Roberts, the resident engineer. Provided, that the execution of the work from the eastern line of the city to the mouth of Suke's run, shall not be commenced until

the corporation of the city of Pittsburg make the guarantee proposed by a resolution of their city councils, dated the 25th day of April, '87.

Mr. Lacock offered as an amendment, that the construction of the aqueduct should be made contingent upon the execution of the guarantee.

On the question of adopting the amendment, Messrs. Lacock, and Mowry, voted in the affirmative; Messrs. Enoch, Dallas, Montgomery, Phillips, and Scott, in the negative. So the amendment was lost.

The question recurring on the resolution as proposed, Messrs. Dallas, Phillips, Enoch, and Scott, voted in the affirmative; and Messrs. Montgomery, Lacock, and Mowry, in the negative. So the resolution was agreed to.

Mr. Lacock offered the following resolution:

Resolved, That it is expedient to form a connection between the canal on the west side, at or near the aqueduct and the Allegheny river.

On the question of adopting this resolution, Messrs. Lacock, Mowry, Montgomery, Dallas, and Scott, voted in the affirmative; Messrs. Enoch, and Phillips, in the negative. So the resolution was agreed to.

The following resolution was then offered, as comprehending the several decisions of the board, to be submitted to the engineer for his approbation, and to his Excellency the Governor, for his consent.

Resolved, That the resolution of the board, passed on the 9th day of August last, locating the western division of the Pennsylvania canal, on the east side of the Allegheny river, from Pine creek to the city line of Pittsburg, be now rescinded; and that the location of the said western division, with the approbation of Nathan S. Roberts, engineer, (if his Excellency the Governor, shall consent thereto) be now continued from Section No. 95, at present under contract, on such a level as to admit of an aqueduct over the Allegheny river, to a point opposite or nearly opposite to Washington-street, in the city of Pittsburg, thence by aqueduct through Grant's hill, to terminate in the Monongahela river, at the mouth of Suke's run; that the dimensions of the canal and of the locks necessary thereto, be the same as formerly determined on for the western division.

Resolved, That the engineer for the western division, be instructed to form a connection, by means of locks and other necessary works, between the canal on the west side, at or near the aqueduct and the Allegheny river, and that such connection be considered a part of this location.

On the question of agreeing to these resolutions, all the members present to-day, voted in the affirmative. So the resolutions were agreed to.

On motion, Messrs Enoch and Phillips, were appointed a committee to wait on his Excellency the Governor, and to obtain his consent to the location as proposed by the last resolutions.

Adjourned by unanimous vote, to 3 o'clock; P. M.

Harrisburg, May 7th, 1827.

3 P. M.—The board met.

Present, David Scott, Esq. president, Messrs. Lacock, Mowry, Enoch, Phillips and Montgomery.

Messrs. Enoch and Phillips, from the committee appointed for that purpose, informed the board that they had obtained the written consent of his excellency the governor, to the location made by resolution of this morning.

Resolved unanimously, That the compensation of the superintendent of stone work, on the Eastern Division of the Pennsylvania canal, shall not for the future exceed three dollars a day.

Resolved unanimously, That his excellency the governor, be respectfully requested to give notice to such gentlemen as may be appointed canal commissioners, under the late act of the legislature, to meet in Harrisburg on the second day of June next, as in the opinion of the present board, an early meeting is demanded by the interests of the commonwealth.

Resolved, That upon the several lines of canal now under contract, or which may be hereafter located or put under contract, the engineer with the consent of the acting commissioner, shall appoint such a number of assistant engineers, target bearers, chain bearers, axemen, pack-horsemen, cooks and wagoners, as they may think necessary. The assistant engineers to receive \$60 a month, the target bearers \$1 50 a day; the chain bearers, axemen and cooks, not exceeding one dollar a day, and the wagoners and pack horse-men, including use of wagons and horses, not exceeding \$2 50 a day.

Resolved unanimously, That during the recess of the board, the president be authorised to contract with competent engineers, for the performance of the surveys and the location of canal routes, authorised by law, and to assign to them their respective duties.

Adjourned *sine die*.

Harrisburg, June 2d, 1827.

9 A. M.—The canal commissioners, appointed by the governor under the act of 16th April last, met.

Present, David Scott, Abner Lacock, Daniel Montgomery, Thomas Enoch, Charles Mowry, John Phillips, Jonathan Roberts and James Clark, Esq's.

The governor's commission having been read,

Resolved unanimously, That the commissioners proceed to organise by the election of a president and secretary.

On counting the ballots, it appeared that David Scott, Esq. was unanimously elected president, and that Joseph M'Ilvaine was unanimously appointed secretary.

Resolved, That the salary of the secretary be fixed at four hundred dollars a year.

The president made report,

That in pursuance of the authority conferred upon him at the last session of the board, he authorised the secretary of the board to make the necessary enquiries, and engage the services of competent engineers to perform the several services contemplated by law. The correspondence which has taken place on this subject is herewith submitted. It will appear that an engagement has been entered into with Dewitt Clinton jr. Esq. for his services as a chief engineer and that Mr. Clinton awaits only the orders of the board. With James Ferguson, Esq. a similar engagement has also been made and he is expected to be in Harrisburg before the adjournment of the board. It will appear also, that Charles T. Whippo, Esq. of New York, John Wilson, Esq. late chief engineer of the state of South Carolina, F. R. Hassler, Edmund Blunt and John Randel, jr. all gentlemen of talents and respectability are ready to engage upon such terms as the board can offer. It is believed moreover, that major Douglass may be induced to give his services during the months of June, July and August, and that Mr. Sargent, at present chief engineer upon the Champlain canal, in the state of New York, may also be procured, if the board think proper.

The correspondence referred to in the foregoing report and the several applications and recommendations of engineers were then read.

The following resolutions were offered for consideration.

Resolved, That Abner Lacock, Esq. be appointed an acting commissioner and that he be requested to superintend the line of canal from Pittsburg, up the Allegheny, Kiskeminetas and Conemaugh, to Blairville; and also the preparation of the Conneaut feeder for contracts.

Resolved, That Charles Mowry, Esq. be appointed an acting commissioner and that he be requested to superintend the line of canal from the mouth of Swatara to Northumberland.

Resolved, That James Clark, Esq. be appointed a superintendent for the proposed line of canal from the mouth of Juniata to Lewistown, with the same powers, duties and responsibilities as an acting commissioner.

On the first resolution Messrs. Scott, Enoch, Montgomery, Mowry, Roberts, Clark and Phillips, voted in the affirmative. Negative none.

On the second resolution Messrs. Scott, Enoch, Montgomery, Roberts, Clark and Phillips, voted in the affirmative. Negative none.

On the third resolution Messrs. Scott, Enoch, Montgomery, Roberts, Mowry and Phillips, voted in the affirmative. Negative none. So the several resolutions were agreed to.

Resolved unanimously, That a committee be appointed to consider the report of the president in relation to the engineers, to ex-

amine the applications and recommendations received; to report the number required for the service of the present season, and to arrange the stations and duties of such as they may deem competent.

Messrs. Montgomery, Enoch and Roberts, were named to compose that committee.

Mr. Enoch presented a communication from Abner Lacock, Esq. acting commissioner for the western division, and offered for consideration the following resolution.

Resolved, that the board with the approbation of Nathan S. Roberts, their engineer, (if his excellency the governor shall consent thereto) do hereby determine in part, the location of the canal from the mouth of Kiskeminetas to Blairsville, as follows: Beginning at the aqueduct across the Allegheny river at the mouth of Kiskeminetas and proceeding thence up that stream, according to the location made by the said Nathan S. Roberts and by George T. Olmstead, a distance of twenty miles, subject to such occasional alterations in the location and other particulars as the engineer and acting commissioner may deem necessary. That the dimensions of the said canal and of the locks necessary thereto shall correspond with those of the western division, as now under contract.

On the question of adopting this resolution, Messrs. Enoch, Mowry, Montgomery, Clark, Roberts, Phillips and Scott, voted in the affirmative. In the negative none. So the resolution was unanimously agreed to.

Resolved, That Messrs. Clark and Phillips be a committee to wait on the governor and ask his consent to the location, as made by the foregoing resolution.

The following preamble and resolution were offered by Mr. Scott.

Whereas numerous applications have been made to the board by citizens and residents of Pennsylvania, for employment as engineers, assistant engineers, surveyors and for other situations in the location and construction of the canal now in contemplation. And whereas the interests and honor of the commonwealth require, that the board should foster and encourage the talent and enterprize of our own citizens. Therefore,

Resolved, That in the employment of persons in the prosecution of the system of internal improvment authorized by the legislature, the board will in all cases give a preference to citizens of Pennsylvania, possessing competent abilities.

On the passage of this resolution, Messrs. Enoch, Montgomery, Mowry, Clark, Phillips, Roberts and Scott, voted in the affirmative. So the same was unanimously adopted.

Resolved unanimously, That a copy of the foregoing resolution be furnished to each engineer in the service of the board.

Resolved unanimously, That the board do now adjourn to three o'clock this afternoon.

Adjourned to 3, P. M.

Harrisburg, June 2, 1827. 3 P. M.

The Board met. Present as this morning.

The committee appointed this morning, in relation to the employment of additional engineers, reported for consideration, the following resolutions.

Resolved, That Dewitt Clinton, Jr. Esq. be appointed an engineer in the service of the board, at the rate of \$3000 a year, and that the charge of the proposed canal from the mouth of Juniata to Lewistown, be assigned him.

Resolved, That James Ferguson, John Randell, Jr. John Wilson, Henry G. Sargent, and Charles T Whippo, be employed as engineers, at the rate of \$4 a day, and that the following duties be assigned them:—

Mr. Ferguson to take charge of the Conneaut feeder, and make a survey and estimate from thence to the mouth of French creek, Mr. Randell to make a survey and estimate for a canal, from Northumberland to the New York canal. Mr. Sargent to take charge of the Delaware line. Mr. Wilson to make a survey and estimate, through the Chester valley. Mr. Whippo to make a survey from Pittsburg, by Beaver, to the Conneaut summit.

Resolved, That Major Douglass be employed, during the months of June, July, and August, if he will consent to serve, with instructions to aid in the preparation of the Conneaut feeder, and to survey a line from thence to Lake Erie.

Resolved, That the president be authorised, during the recess of the board, to fill vacancies which may exist from non-acceptance of these appointments, and to make such other arrangements as circumstances may render necessary.

On the question of agreeing to the resolutions as reported by the committee, Messrs. Enoch, Mowry, Phillips, Montgomery, Clarke, Roberts, and Scott, voted in the affirmative. In the negative, none. So the resolutions were unanimously adopted.

Messrs. Clarke, and Phillips, reported that they had obtained the consent of the Governor, to the location of the canal along the Kiskeminetas, as made by resolution of this morning.

Mr. Scott offered the following resolutions:

Resolved, That Messrs. Guilford, and Clinton, be directed to make further examinations on each side of the Juniata, between the mouth of that river and Lewistown, in order to ascertain which side of the river is most favorable, and most proper to be adopted, for the construction of a canal—and also to examine, and determine as to the manner and place at which the said canal shall cross the Susquehanna: whether by an aqueduct or by a tow-path bridge, and whether it would be practicable and advantageous to connect a bridge with it, and make their report to the board at their next meeting on Friday the 29th day of June next.

Resolved, That Mr. Guilford report to the board, the result of his examinations between the mouth of Juniata and Northumber-

land, at the next meeting of the board, on the 29th day of June next.

On the question of agreeing to these resolutions, Messrs. Enoch, Mowry, Clarke, Roberts, Montgomery, Phillips and Scott voted in the affirmative.

So the same were unanimously adopted.

The following resolution was offered for consideration :

Resolved, That the board with the approbation of David B. Douglass, their engineer, as expressed in his report of the first of January last, (if his excellency the governor shall consent thereto) do now determine in part, the location of the feeder from French creek to the summit level at Conneaut lake, as follows : Beginning at a point at or near the dam of Bemis' mill, in French creek, and proceeding down on the east side of said creek, to the point near the mouth of the Conneaut outlet, designated in the report of said engineer for crossing the same. That the dimensions of the said feeder be as follows: Forty feet wide at the water line, twenty-eight feet at the bottom, and four feet in depth, with a descent of three inches per mile. That the said feeder be so adjusted that in case of its future continuation to the Conneaut lake the surface of the lake may be raised to an habitual elevation of from eight to ten feet above its present level, as recommended in the report of said engineer, and that the part now located, be adapted to any future communication between the Pennsylvania canal and lake Erie. It being understood that the location now made shall be subject to such occasional alterations as the engineer, and acting commissioner may deem necessary, for accomplishing the general objects in view.

The yeas and nays being called on this resolution, Messrs. Enoch, Mowry, Clarke, Roberts, Montgomery, Phillips and Scott, voted in the affirmative.—Negative none.

So the resolution was unanimously agreed to.

Resolved unanimously, That the engineer charged with the construction of the Conneaut feeder, be directed to prepare, and the acting commissioner to advertise for contracts, that portion of it which has been located by this day's resolution.

The secretary made report, that in pursuance of authority given to him, at the last meeting of the board, he has employed captain Abraham Horn, of Easton, to obtain releases along the Delaware line, at the rate of \$1 50 a day, while so engaged.

Resolved unanimously, That the said appointment be confirmed.

The following resolution having been read, was unanimously agreed to.

Resolved, That information be communicated to the governor, that in addition to the money already called for a sum not exceeding \$800,000 will probably be required for the construction of the canals during the present season, in five equal monthly instalments, commencing on the first day of August next.

The following resolution having been read, was unanimously agreed to.

Resolved, That the following items—erroneously left out of the suspending accounts, confirmed at the last meeting of the board, viz. \$30, paid to Christian Gleim, in Wm. Strickland's account, and 60 cents in Judge Rawle's account, be allowed to C. Mowry, and that he have credit for the same in the settlement of his accounts as acting commissioner.

Resolved unanimously, That when the board adjourns it will adjourn to meet in Harrisburg, on the 29th day of June instant, at 9 A. M.—Adjourned.

Harrisburg, June 29th, 1827, 10 A. M.

The board met. Present Messrs. Montgomery, Roberts, Mowry, Clarke and Phillips.

The President being absent Mr. Montgomery was called to the chair.

The superintendent of surveys made the following report.

That since the last meeting of the board the following surveys have been organized, and the engineers entrusted therewith have commenced operations. First, the survey of the North branch of Susquehanna, by John Randall, jr. Second the survey through Chester, and Lancaster county, by John Wilson, Esq. Third, the survey from the Conneaut summit to Lake Erie, by D. B. Douglass. Fourth, the further examination of the summit between the Allegheny and Susquehanna, by Wm. Wilson, Esq. Mr. Mitchell has been instructed to assist Mr. Wilson, in the latter examination, and has been furnished with the instruments necessary for the purpose, but has not yet commenced operations. Mr. Whipple and Mr. Sargent are daily expected from the state of New-York, and will be despatched to the duty assigned them with the least possible delay.

Resolved unanimously, That the president request his excellency, the governor to draw his warrant on the Treasurer of the commonwealth, for the sum of five thousand dollars, for the purposes of the surveys now making or about to be made under the act, entitled "An act to appoint a board of canal commissioners."

Resolved, That the board do now adjourn to meet again at this place on the 2nd day of July, at 9 A. M. and that in the mean time, they will proceed to view the two sides of the Juniata, and the proposed points for crossing the Susquehanna river.

Adjourned to the 2nd July at 9 A. M.

Harrisburg, July 2, 1827, 9 A. M.

The board met. Present David Scott, Esq. president, Messrs. Montgomery, Enoch, Mowry, Phillips, Roberts, and Clarke.

The president made the following report. That during the recess of the board, he has employed John W. Robinson and Asa Jackson, as agents to procure releases between the state line, and

the northern line of Columbia county. Copies of their appointments, and instructions are herewith submitted.

That he has also aided in the organization of the party under Mr. Randall, the engineer, upon the North branch of the Susquehanna, and has given Mr. Randall, written instructions, a copy of which is herewith also submitted: which acts, not having been specially authorised by the board, it is respectfully requested, may be approved.

Resolved unanimously, That the foregoing report be accepted, and that the proceedings of the president, as detailed therein be confirmed.

The president laid before the board, a report from Mr. Guilford, upon the location of the canal along the Susquehanna, from the eastern division to Northumberland, accompanied by drafts and estimates of the routes on both sides of the river.

A memorial from the citizens of Millersburg, and its vicinity, in favor of a location on the east side of the Susquehanna, accompanied by affidavits and other documents, was read.

Communications from several committees appointed to represent the advantages of a location on the east side of the Susquehanna, asking to be heard before the board, were received.

On motion,

Resolved, That the said committees be invited to attend this afternoon, at 3 o'clock.

A communication from Abner Lacock, acting commissioner, informing the board that he has entered into a contract for the construction of an aqueduct at Pittsburg, was read.

Resolved, unanimously, That the contract entered into by the acting commissioner for the western division, for the construction of an aqueduct across the Allegheny river, at or near Pittsburg, as reported this day, be approved and confirmed.

Resolved, unanimously, That the acting commissioner for the eastern division be authorized to settle with James M'Ginnis, for damages done to his property near the Penn lock, and to take a conveyance of his right and title to the same, provided the consideration shall not exceed three hundred and fifty dollars.

Resolved, unanimously, That John Philips, Esq. be appointed a superintendant for the proposed French creek feeder, with the same power, duties, and responsibilities as an acting commissioner.

Resolved unanimously, That Mr. Philips be directed as soon as possible to advertise for contracts on the line of the French creek Feeder, as fixed by resolution of the 2nd of June last.

Resolved unanimously, That that part of the resolution of 2nd June last, which assigns to Mr. Lacock the charge of the French creek Feeder, be rescinded.

Resolved unanimously, That the superintendants for the Juniata canal and French creek Feeder, be respectively authorised to employ a suitable person as clerk at a rate of compensation not exceeding two dollars a day.

Resolved unanimously, That the board adjourn to this afternoon at 3 o'clock.

Adjourned to 3 P. M.

Harrisburg, July 2, 1827.

3 P. M.—The Board met. Present as this morning.

The several committees appointed to represent the advantages of a location on the East side of the Susquehanna river, appeared and were heard at full length.

The following report was received from Mr. Clinton :

I have the honor to report in part my opinion, on the relative advantages of the sides of the Juniata river, for the construction of a canal from Lewistown to the Susquehanna river. In submitting my views on this subject, I remark that I have predicated them on a careful examination of the economy of the work, and the benefits which will result to the citizens from the location of the line.

I therefore recommend that the canal should commence at the mouth of the Ki-hocoquillis creek, at Lewistown, and continue on the north side of the river to North's Island, at this point, to cross by a dam to the south side of the river, and end for the present at or near the head of Duncan's lower Island, until new examinations can be made to establish the most eligible point to terminate the canal on the Susquehanna river.

The following report was received from Mr. Guilford:

In compliance with the resolutions of the Board, directing Mr. Clinton and myself to "make further examinations on each side of the Juniata river, between the mouth of that river and Lewistown, in order to ascertain which side of the river is most favorable and most proper to be adopted for the construction of a canal,"

I have the honour to report: that from an examination of the North and South sides of the Juniata river, from Duncan's lower Island to North's Island near Millerstown, I concur with Mr. Clinton, in the opinion that the south bank of the Juniata, from Duncan's to North's Island, is the most proper to be adopted for the location of a canal.

I have not had time since the resolution of the Board to finish the surveys on the Susquehanna, and make further examinations on the Juniata river, but from the descriptions given by Mr. Clinton, Mr. White and respectable people who are acquainted with the topography of the country, in the vicinity of the Juniata above Millerstown, I believe the north side of the Juniata is most suitable for the construction of the canal above that place.

The following resolution was offered for consideration :

Resolved, That the Board with the approbation of Simeon Guilford, their engineer (if his Excellency, the governor shall consent thereto) do now determine in part the location of the canal, up the valley of the Susquehanna, from the Eastern division of the Pennsylvania canal, to a point at or near the town of Northumberland, as follows:—Beginning at a point at or near Huling's bridge, on the main land, on the west side of the Susquehanna river, and

proceeding thence up the said river according to the report and draft of said engineer, to a point opposite the town of Northumberland near the junction of the North and West branches also designated in the said report and draft, subject to such occasional alterations in the location and other particulars as the engineer and acting commissioner may find necessary. That the dimensions of said canal shall be as follows: 40 feet wide on the water line, 28 feet at bottom, and 4 feet in depth. That the dimensions of the locks shall be as follows: 15 feet in width, and 90 feet in length within the chamber.

On the question of agreeing to this resolution, Messrs. Montgomery, Clark, Phillips, Mowry, Enoch, Roberts and Scott, voted in the affirmative. So the resolution was unanimously agreed to.

The following resolution was offered for consideration:

Resolved, That the Board, with the approbation of De Witt Clinton jr. and Simeon Guilford, their engineers (if his Excellency, the governor shall consent thereto) do now determine in part the location of the canal, up the valley of the Juniata, from the Eastern division of the Pennsylvania canal to a point, at or near Lewistown, as follows:—Beginning at a point on the Juniata river, at the mouth of Kishacoquillis creek, and extending thence down the said river on the north side thereof according to the report of the said De Witt Clinton, jr. and the location made by Canvess White to North's Island near the village of Millerstown, thence across the said river and down the south side thereof, to a point at or near the head of Duncan's lower Island: subject to such occasional alterations in the location and other particulars, as the engineer and superintendant may find necessary. That the dimensions of the said canal shall be as follows—40 feet on the water line, 28 feet at the bottom and 4 feet in depth. That the dimensions of the locks shall be as follows—15 feet in width, and 90 feet within the chamber.

On the question of agreeing to this resolution Messrs. Montgomery, Clark, Phillips, Mowry, Enoch, Roberts and Scott voted in the affirmative. So the resolution was unanimously agreed to.

Resolved unanimously, That the engineer for the Susquehanna division be directed to prepare, and the superintendent to advertise the same for contracts as soon as possible, in conformity with law.

Resolved unanimously, That the engineer for the Juniata division be directed to prepare, and the superintendent to advertise the same for contracts as soon as possible, in conformity with law.

Resolved unanimously, that the president be authorised to request his excellency the governor to draw his warrant or warrants in favor of the treasurer of the board, for such sum or sums, not exceeding three hundred and twenty thousand dollars in the whole, as may appear to be wanted for the construction of the canals, to be placed with the treasurer of the board, subject to the orders of the acting commissioners and superintendents.

Resolved unanimously, That when the board adjourns, it adjourns to meet at this place on the 1st day of August next.

Harrisburgh, August 1st, 1827.

6. A. M. The board met.

Present, David Scott, Esq. president, Messrs. Montgomery, Lacock, Mowry, Roberts, Clarke and Phillips.

The superintendent of surveys made report upon the situation and prospects of the several surveys under his direction.

A letter from John Wilson, esq. dated July 28th, from H. S. Sargeant of the same date, from James Ferguson, dated July 16th, and two letters from William Wilson, dated 1st and 5th of July, were read.

The following communications were read:

From a committee of the citizens of Newtown upon the location of the Delaware line. From a committee of citizens of Blairsville in relation to the effect of the canal in the navigation of the Kiskiminetas. From a chairman and secretary of a public meeting in Lewistown on the subject of the Juniata canal. From E. Banks and nineteen other citizens of Lewistown, in opposition to the foregoing communication. A private communication from Joseph Martin secretary of the public meeting at Lewistown. A memorial of citizens of Halifax. Millersburgh and their vicinity, asking for a location of the Susquehanna division on the east banks of that river.

A communication from H. R. Schetterly on behalf of gentlemen from Halifax and Millersburg asking to be heard before the board on the subject of the Susquehanna canal, was read.

Resolved unanimously, That Mr. Schetterly and the gentlemen who accompany him, be invited to a conference with the board in half an hour from this time.

Communications from James S. Espy and Co. of Harrisburg, from John Foster, esq. on behalf of the heirs of Wm. Maclay, (dec.) George Fisher, esq. of Harrisburg, and from Archibald M'Allister of Dauphin county, on the subject of damages done to their property along the eastern division, were severally received and read.

The gentlemen from Halifax and Millersburg appeared according to invitation and were heard in support of their memorial, and of their proposition to change the location of the Susquehanna division, so as to fix it partly on the east bank of that river.

The following was then offered for consideration:

Resolved, That the board having received, read and duly considered the memorial of the citizens of Halifax, Millersburg and their vicinity, relative to a change in the location of a portion of the Susquehanna division of the Pennsylvania canal, are of opinion that the location already made is better calculated to promote the public interest than any other which can be adopted.

The names of members being called on this resolution Messrs. Lacock, Mowry, Clarke, Phillips Roberts and Scott voted in the affirmative. Mr. Montgomery in the negative.

So the resolution was agreed to.

Resolved unanimously, That the communication from Blairsville be referred to a committee, with instructions to consider the same and report thereon to-morrow morning.

Messrs. Roberts, Clarke and Phillips were named to compose the committee.

Resolved unanimously, That a committee be appointed to consider the place and mode of connecting the Juniata and Susquehanna canals, and the place and mode of crossing the Susquehanna river, with instructions to report to-morrow, and that Messrs. Guilford and Clinton be requested to attend upon the committee with their joint report if they agree, and if not, their several reports on those subjects.

Messrs. Montgomery, Lacock and Clarke were named to compose that committee.

Resolved unanimously, That the board do now adjourn to five o'clock, to-morrow morning.

Harrisburg, August 2d, 1827.

5. A. M. The board met.—Present as yesterday.

The following resolutions were offered for consideration.

Resolved, That the agreement made by A. Lacock, acting commissioner, with Henry Richablanch, for damages caused by the taking down and removal of his house on the western division be approved and confirmed, and that the sum of one hundred dollars be paid to said Richablanch in conformity with said agreement.

Resolved, That the agreement made by A. Lacock, acting commissioner, with Fiddle Bowers for damages caused by the passage of the western division through land occupied by him, as a renter, be approved and confirmed, and that the sum of seventy-five dollars be paid to said Bowers in conformity with said agreement.

The names of members being called on the foregoing resolutions, Messrs. Montgomery, Roberts, Clarke, Phillips, Wovry, Lacock and Scott voted in the affirmative. So the same were unanimously agreed to.

Resolved unanimously, That the acting commissioners on the lines of canal now under contract, or that may hereafter be placed under contract, be authorised respectively to communicate with persons claiming damages above the sum of thirty dollars, and to ascertain and report such facts as will enable the board to decide upon the merits of such claims, and the just measure of damages (if any) sustained, and also to report to the board his own opinion in each case.

Resolved unanimously, That the acting commissioners on the eastern and western divisions of the Pennsylvania canal, be strictly enjoined and required to have the parts of the canal now under contract (except that part which lies on the east side of the Allegheny river at Pittsburgh) completed and open for navigation by the first day of March next.

The committee to whom was yesterday referred the memorial of a committee of citizens of Blairsville requesting the board to pro-

vide means for navigating the Kiskiminetas at those points where it has become necessary to dam that river, made report, that having given that subject their attentive consideration, they do not think it expedient that any order should be taken by the board thereon, inasmuch as any works which might be constructed could not be useful until the canal shall be completed, and that thereafter it would be useless, and for the further reason that any works constructed for the passage down the river, as proposed by the memorialists would hazard or render insecure the dams and canal. They therefore offer the following resolution:

Resolved, That the committee be discharged from the further consideration of this subject.

On this resolution the yeas were, Messrs Phillips, Roberts, Montgomery, Mowry, Lacock and Scott. So the resolution was agreed to.

The committee to whom was yesterday referred the place and mode of uniting the Susquehanna and Juniata canals, and the place and mode of crossing the Susquehanna river, made report.

That the estimate cost of uniting the canal over the south side of the Juniata, near the head of Duncan's Island, and of continuing thence to Clark's lower ferry, and of an aqueduct across the Susquehanna at the latter place, with locks so as to connect with the eastern division, is \$295,088. That the estimated cost of uniting said canals on the north side of the Juniata, and of continuing thence to the point of Duncan's Island—and of an aqueduct across the Susquehanna at the latter point, with locks, so as to connect with the eastern division, is \$240,887, making the balance in favor of the Duncan's Island route \$58,201. Your committee therefore, recommend the confirmation of the location of canals down Duncan's Island to the Susquehanna; and that an aqueduct and bridge be made across the river, from the point of Duncan's Island, with locks from thence to intersect with the eastern division.

The same committee also laid before the board, the joint report of Messrs Guilford and Clinton, on the same subject.

The said reports having been read were laid on the table.—

Resolved unanimously, That his excellency the governor, be requested to draw his warrants on the Treasurer of the commonwealth for the further sum of \$48,000 to be placed with the Treasurer of the board, subject to the orders of the acting commissioners and superintendants, at the following times, namely; one hundred and eighty thousand dollars on the first day of October next; one hundred and eighty thousand on the first day of November next; and one hundred and twenty thousand dollars on the first day of December next.

Resolved unanimously, That the board do now adjourn, to half past four o'clock to-morrow morning.

Adjourned to to-morrow, at half past four A. M.

Harrisburg, August 3d, 1827, half past four A. M.

The board met. Present as yesterday.

The following resolutions were offered for consideration:

Resolved, That the eastern division of the Pennsylvania canal, be extended to a point opposite the lower end of Duncan's small Island.

Resolved, That the acting commissioner on the eastern division, be instructed to procure the vacation of the contract for the erection of the dam across the Susquehanna river, at the end of Peter's mountain, and that he be authorised to enter into a contract for the erection of a dam across the Susquehanna, at the lower point of Duncan's small Island.

Resolved. That the question relative to the connexion of the Susquehanna and Juniata canals, and the mode of crossing the Susquehanna river, be postponed.

The names of members, being called on these resolutions separately—

On the first resolution, Messrs. Montgomery, Roberts, Clark, Phillips, Mowry, Lacock and Scott, voted in the affirmative. So the first resolution was unanimously agreed to.

On the second resolution, the same gentlemen voted in the affirmative. So the second resolution was unanimously agreed to.

On the third resolution, Messrs Montgomery, Roberts, Clarke, Mowry, Lacock and Scott, voted in the affirmative. Mr. Phillips in the negative. So the third resolution was agreed to.

Resolved unanimously, That the board with the approbation of Francis W. Rawle, their engineer (if his excellency the Governor, shall consent thereto) do now change the location, of the eastern division of the Pennsylvania canal, by continuing the same from its present termination at Forster's falls, to a point opposite the lower end of Duncan's small Island.

Resolved unanimously, That when the board adjourns, it adjourn to meet at Bristol on the 20th day of the present month, at 8 o'clock, A. M.

Adjourned to August 20th, at 8 A. M.

Bristol, August 20, 1827, 8 A. M.

This being the time to which the board stood adjourned, Messrs Sergeant, Mowry, Roberts, and Clarke attended. A quorum not being present, and there being no prospect of any other members arriving, it was determined to adjourn to meet in Philadelphia, on the 10th day of September next, at 9 A. M. and the secretary was directed to give notice accordingly.

Philadelphia, September 10th, 1827, 9 A. M.

The board met.

Present David Scott, Esq. president. Messrs. Sergeant, Enoch, Mowry and Roberts.

Thomas Sergeant, Esq. on behalf of the inhabitants of Bristol, and John Swift, Esq. on behalf of the inhabitants of Tully-town and its vicinity, appeared before the board, and requested to be heard in reference to the point of terminating the Delaware canal.

J. Miller, Esqr. on behalf of certain of the citizens of Perry county, also appeared; and asked to be heard in relation to the place of crossing the Susquehanna river, near the mouth of Juniata.

Resolved unanimously, That all communications to the board in relation to the location of canal routes, shall be made in writing.

Resolved unanimously, That the Secretary be directed to inform the gentlemen now in attendance, that the board will be prepared to receive their written communications this afternoon at 3 o'clock.

A communication from the Secretary of the commonwealth, informing the board that the Governor had suspended his consent to the change of location on the eastern division, made by resolution of the 3d of August last, and asking that the same might be reconsidered was laid before the board by the President.

The following resolution was offered by Mr. Enoch.

Resolved, That the board with the approbation of Alonzo Livermore, their engineer, (if his excellency the Governor shall consent thereto) do now complete the location of the canal, from the mouth of Kiskeminetas to Blairsville, as follows: Beginning at the termination of the partial location, as made by resolution of 2d June last, thence according to the report and draft made by George T. Olmstead, to a point at or near the town of Blairsville, subject to such occasional alterations in the location, and other particulars, as the acting commissioner and engineer may deem necessary. That the dimensions of the locks, shall correspond with those heretofore fixed for the portion of the same canal already located.

The yeas and nays being called, all the members present voted in the affirmative, so the resolution was unanimously adopted.

Resolved unanimously, that the agreement made by A. Lacock, acting commissioner, with John Waite for \$140, for damages occasioned by the passage of the canal through his lot of ground in the town of Warren; and with George Thomas for \$100 for damages caused by the removal of his buildings, be and the same is hereby confirmed.

The superintendant of surveys made report of the state of that department, and laid before the board, letters from Messrs. Douglass, J. Wilson, Randel, Whippo, W. Wilson and Mitchell.

On motion, adjourned to this afternoon at 3 o'clock.

Philadelphia, Sept, 10, 1827, 3 P. M.

Present as this morning.

A communication from T. Sargeant, Esq. on behalf of the inhabitants of Bristol, accompanied by documents; from John Swift, Esq. and others on behalf of the inhabitants of Tully-town and its vicinity, and accompanied by documents; from J. Miller, Esq. on behalf of the citizens of Perry county, were received and read.

Mr. Sargeant offered the following resolutions:

Resolved, That in locating the Pennsylvania canal, it is the duty of the commissioners to consider the great interests of the commonwealth, and to adopt such plans as appear to them upon due enquiry and examination, to be recommended by superior efficiency and economy.

Resolved, That the interests and wishes of individuals can only be regarded when they are not inconsistent with the great purpose of the public accommodation.

Resolved, That after carefully and repeatedly considering the location of the line of canal and of the dam across the Susquehanna near the mouth of the Juniata, with all the light the board has been able to obtain and with an anxious desire to conform as far as possible to the wishes of the citizens who have applied to the board, whose representations have been respectfully considered, on that subject the board is satisfied there is no just ground for departing from the decision made by resolution of August 3d, last, and accordingly does hereby declare its adherence to that decision.

The question being taken on the resolutions separately, it appeared that all were unanimously agreed to.

The following preamble and resolutions were offered for consideration.

Whereas, after suitable examinations by competent engineers, it appears to the board that a navigable canal can be constructed between a point at Bristol, and a point at or near the borough of Easton, at an average expense not exceeding \$12,000 per mile.— And whereas, it appears that a portion of said navigable communication beginning at Bristol, and extending a distance of eighteen miles, may be executed for the sum of one hundred thousand dollars. Therefore,

Resolved, That the board with the approbation of Henry G. Sargeant, their engineer, (if his excellency the governor shall consent thereto,) do now locate a portion of the said canal; beginning at or near the mouth of Mill creek in the said borough of Bristol, and extending thence according to the report and draft of the said engineer, up the valley of the Delaware a distance of eighteen miles; that the dimensions of the said canal shall be as follows: Forty feet on the water line; twenty-five feet at the bottom, and with five feet depth of water. That the locks shall be eleven feet in width, and one hundred feet within the chamber.

The names being called it appeared that the same was unanimously agreed to.

A communication was received from Messrs. Sutherland and Burden, members of the legislature from the county of Philadelphia, asking that the commissioners would view the proposed canal route across the districts of Southwark, Moyamensing and Pas-yunk, between the Delaware and Schuylkill.

Whereupon it was resolved, That the commissioners will proceed to view the said route, previous to their session to-morrow,

and that the secretary be directed to provide the necessary conveyances.

Resolved, That the board do now adjourn to meet at 12 o'clock to-morrow.

Adjourned to noon to-morrow.

Philadelphia, Sept. 11, 1827.

The board after viewing the proposed line of canal between the Delaware and Schuylkill, met at this time pursuant to adjournment.

Present as yesterday.

Resolved unanimously, That Thomas G. Kennedy, Esq. be appointed a superintendant for the Delaware division of the Pennsylvania canal, with the same powers, duties and responsibility as an acting commissioner.

Resolved unanimously, That the engineer for the Delaware division be instructed to prepare, and the superintendant to advertise the same for contracts, according to the location made by yesterday's resolution.

Resolved unanimously, That the salary of Henry G. Sargeant as an engineer in the service of the board, shall be at the rate of \$2000 a year, to commence from the first day of July last.

Resolved unanimously, That the president request his excellency the governor, to draw his warrant on the treasurer of the commonwealth for the sum of three thousand dollars to be applied to the purposes of the surveys now making, or about to be made under the act entitled "An act to appoint a board of canal commissioners."

Resolved, That when the board adjourns, it adjourn to meet at Blairsville on the 18th day of October, and that notice be given to the absent members accordingly.

Adjourned to meet at Blairsville on the 18th. of October next at 3, P. M.

Blairsville, October 18th, 1827.

The Board met according to adjournment.

Present David Scott, Esq. president, Messrs. Lacock, Clark, Phillips and Enoch.

On motion. The board adjourned to to-morrow at 9 A. M.

Blairsville, October 19th, 1827.

The board met.—Present as yesterday.

A communication from the burgess and town council of Blairsville, praying that a basin might be formed at the town, was received, and having been read, was laid on the table.

The following resolutions were unanimously adopted:

Resolved, That his excellency the governor, be requested to make a further loan of forty thousand dollars, the balance of the loan of one million authorized by law, and that he be further requested to draw his warrant on the treasurer of the commonwealth

for said sum of \$40,000 to be placed with the treasurer of the board; subject to the order of the acting commissioners and superintendants, on the 15th day of December next.

Resolved, That his excellency the governor, be informed that the expenditures on the French creek feeder up to the first day of March next, will probably amount to a sum not exceeding \$25,000, and those on the Delaware to a sum not exceeding \$20,000.

Adjourned to to-morrow morning.

Blairsville, October 20th, 1827

The board met.—Present as yesterday.

The following resolutions having been read, were unanimously adopted.

Resolved, That the board will adjourn until the 20th day of December next, to meet at Harrisburg, and that the secretary give notice to each member of the board, of this adjournment and earnestly request his attendance.

Resolved, That each acting commissioner and superintendant, be required on or before the 25th day of November next, to make out and forward to the secretary of the board, a detailed report of the particular situation of the work under his charge, of the amount of moneys actually expended upon it, of the amount paid for damages, together with a list of the engineers and other persons employed upon the line, and in short every particular in relation to the subject which is likely to be demanded, with which the board or the legislature should be acquainted, and that they also be required to furnish to the board at the meeting in December, an additional statement of their accounts and proceedings up to the time of the said proposed meeting, embracing all the particulars above referred to.

Resolved, That the secretary be authorised to employ a clerk at an expense not exceeding \$2 per day, to copy the reports and documents, preparatory to the making of the annual report.

Resolved, That the acting commissioners and superintendents, be authorised to contract for the erection of so many buildings for the accommodation of Lock Keepers on the line of canal under their respective superintendence as may be necessary. Provided that at least 30 days previous notice shall be given by advertisement prior to entering into such contract.

Adjourned to meet at Harrisburg, on the the 20th of December next.

Harrisburg, Dec. 20th, 1827.

7. P. M. The board met this evening according to adjournment.

Present David Scott, Esq. president, Messrs. Sergeant, Lacock, Mowry, Roberts, and Enoch.

Reports from the several acting commissioners and engineers on the lines of canal were received. Laid on the table.

The superintendent of surveys made report, and laid on the table reports from the several engineers under his direction.

Resolved unanimously, That the agreement made by Abner Lacock acting commissioner with David Breneman and Levi Fay, for three hundred dollars as a compensation for injury done to their salt works, be and the same is hereby confirmed.

The board then commenced reading the reports and documents received, which being continued to half past nine,

Adjourned to 9 o'clock, to-morrow morning.

Harrisburg, Dec. 21st, 1827.

9. A. M.—The board met.—Present Mr. Clark, and all others who were present yesterday.

Resolved unanimously, That the salary of James Ferguson as an engineer in the service of the commonwealth, be fixed at two thousand dollars per annum, to commence from the first day of July last.

Resolved unanimously, That the account of Nathan S. Roberts, for his own salary and expenses, as engineer, and for payments made to persons composing the engineer corps, of the western division amounting to \$7,038 24½ and certified by him on the 7th July, 1827, be and the same is hereby confirmed, and that credit for that amount be given to the acting commissioner of that division.

Resolved, That the president request his excellency the governor, to draw his warrant upon the treasurer of the commonwealth, in favor of the board for the sum of two thousand dollars, to be applied to the purposes of the surveys made under the act, entitled "An act to appoint a board of canal commissioners."

The reading of reports and documents was then continued and completed. After discussion upon the principles of a report to the governor,

Resolved unanimously, That the secretary be directed to prepare the sketch of a report to the governor, and to present it to-morrow morning.

Adjourned to 9 A M to morrow morning.

Harrisburg, Dec. 22nd, 1827.

The board met.—Present all the members.

The secretary presented a sketch of that part of a report to the governor, which embraced the recommendations of the board. The same having been read and discussed,

Resolved unanimously, That the secretary be directed to complete the draft of a report and to lay it before the board on Monday next.

Resolved unanimously, That the agreement made by Charles Mowry acting commissioner with H. W. Snyder for \$1,500 damages done to his mills and property on the Susquehanna division, be confirmed.

Resolved unanimously, That the agreement made by the acting commissioner of the western division with Wilson Crawford for \$1. damages done to his property by the canal, be confirmed.

Adjourned until Monday morning at 9 o'clock.

Harrisburg, Dec. 24th, 1827.

9. A. M.—The board met.—Present as on Saturday.

Mr. Enoch offered the following resolutions.

Resolved, That the location of the Susquehanna division be now completed by extending it from its present termination to the point of Duncan's Island, thence to be connected by lock with the pool of the dam now erecting in the Susquehanna river

Resolved, That the engineer of the Juniata division, be directed to report to the board at their next meeting, his opinion as to the most convenient place and mode of extending that division across the Juniata river, and thence to unite with the Susquehanna division, as located by the foregoing resolution

Resolved, That a towing path and road bridge be erected across the Susquehanna, at a convenient point on Duncan's Island above the dam, and that Mr. Guilford be directed to furnish a plan, and the acting commissioner of the Susquehanna division to advertise it for contract.

The question being on the first resolution, Mr. Mowry offered so to amend it, as to provide for an aqueduct across the Susquehanna river

On this amendment, the yeas were Messrs Lacock, and Mowry. Nays Messrs. Sergeant, Roberts, Enoch, Clark, Phillips, Montgomery and Scott. The amendment was lost.

The question recurring on the first resolution, Messrs. Roberts, Lacock, Enoch Sergeant, Montgomery, Mowry and Phillips, voted in the affirmative. Mr. Clark in the negative. So the first resolution was agreed to.

On the 2d resolution all the members voted in the affirmative, so the resolution was adopted.

On the 3d resolution—the yeas and nays were the same as on the first, so the third resolution was agreed to.

The draft of a report to the governor was then submitted by the secretary—same having been discussed and alterations proposed, it was ordered to be transcribed and read to-morrow.

Adjourned to to-morrow at 9, A. M.

Harrisburg, Dec. 25th, 1827.

9 A. M.—The board met—present as yesterday.

The following resolutions were offered by Mr. Sergeant:

Resolved, That the board with the approbation of Simeon Guilford, their engineer, if his excellency the governor shall consent thereto, do now change the dimensions of locks on the Susquehanna division of the Pennsylvania canal, so as to make them of the width of 17 feet.

Resolved, That the board with the approbation of De Witt Clinton, jr. their engineer, if his excellency the governor shall consent thereto, do now change the dimensions of locks on the Juniata division of the Pennsylvania canal, so as to make them of the width of 17 feet.

On the first resolution the yeas were, Messrs. Sergeant, Lacock, Montgomery, Mowry, Phillips, Roberts and Scott. Nays Messrs. Clarke and Enóch. On the second, yeas Messrs. Sergeant, Lacock, Montgomery, Mowry, Phillips and Scott. Nays, Messrs. Clarke, Roberts and Enoch. So both resolutions were agreed to.

The secretary then presented the fair copy of a report as ordered to be transcribed yesterday.

Resolved unanimously, That the same be approved by the board; that it be signed by the president and transmitted to his excellency the governor, with the several documents therein referred to.

Resolved unanimously, That Messrs. Lacock and Mowry acting commissioners, and Mr. Clark superintendant, be authorised to allow their clerks respectively at the rate of \$2 50 per day.

Resolved, That the board do now adjourn to meet again at Harrisburg on the 5th of March next, unless they shall previously receive a notice from the president postponing the meeting to a later day.

Adjourned to the 5th day of March next.

OFFICE OF THE CANAL COMMISSIONERS.

Philadelphia, January 14, 1828.

SIR—

By direction of the canal commissioners, I have the honor to enclose to you a complete estimate by major Wilson, of the cost of a rail-way from the mouth of Swatara down the Susquehanna to Columbia and thence to a point near Philadelphia. The estimated expense from Columbia to the city of Philadelphia, varies by a very small fraction from the sum named by the commissioners in their report.

I have also transmitted to the clerk of the house of representatives for the use of both branches of the legislature, the following drafts of surveys made during the past season.

1. A map of the proposed canal line from Pittsburg by the Beaver and Shenango to the Conneaut lake, by C. T. Whippo, engineer.

2. A draft of a canal line from Bemis' mill on French creek by way of Waterford to Erie harbor, by the same engineer.

3. A map of the proposed canal line from Conneaut lake by way of Elk creek to Erie harbor, by major D. B. Douglass.

4. A connected map prepared under the direction of Mr. Whippo, shewing all the above mentioned lines and also the line of the French creek feeder from Conneaut lake to Bemis' mill.

It is respectfully asked, that you will cause these documents to be laid before the honorable body over which you preside.

With sincere respect,

I have the honor to be,

Your most obt. servant,

JOS. M'ILVAINE,

Superintendent of Surveys.

*Hon. NER MIDDLESWARTH, Speaker of the
House of Representatives of Pennsylvania.*

To the Board of Canal Commissioners of the state of Pennsylvania.

GENTLEMEN—

Having already submitted to the board a preliminary description of a line of rail-way, between the Susquehanna and Schuylkill rivers, in conformity with your instructions, I have now the honor to place before you the remaining part of my report upon the subject with an estimate of the expense of construction.

In describing the nature of the ground over which the survey was conducted for tracing the line of rail-way, it was remarked, that there were considerable difficulties in finding ground suitable for leaving Chester valley in order to extend the line to Philadelphia. Exceptions being made to the 84th section as passing over not only

ravines of great depth but the line itself, being too winding in its course, to render it practicable for the road.

A levelling party was therefore directed to re-examine this section, and also another line along the face of the Valley hill, so as to connect the latter with the summit at Grover's. The examination of the first was fully made, which resulted in the impracticability of graduating any line immediately from the Warren tavern, so as to join the position at Paoli, with the termination of its graduation at the point east of Vanleer's, on the turnpike road. Levels were also carried from Grover's to a very favorable position (three-fourths of a mile in a north-west direction) for connecting the two graduations above mentioned, by means of fixed steam power; but the continued unfavorable state of the weather and the limited time allotted for the explorations, would not allow the party to make so full a report upon the subject as was wished. In order therefore, to close the estimate I have given the probable amount of cost of item 13, leaving this section subject to future examination.

The numerous streams intersected by the line between the Susquehanna and Schuylkill rivers, rendered it necessary that the bridges should be constructed of the least expensive materials. In all those which exceed the mean height of 18 feet, the wooden superstructures are placed upon stone piers of common rubble masonry, and under that height wooden frames resting upon stone foundations support the rail-way. They are all covered to protect them from the weather. Their formation is upon the principle of Town's truss bridges, which I believe to be well calculated for strength, durability and economy.

The methods which have been adopted in the construction of the rail ways in this state, and in Massachusetts, are very similar; they differ only in the material which forms the traverse upon which the wooden rail rests. The one being of wood, and the other stone; and both are placed upon stone foundations to render them secure, and keep them from the influence of frost. The construction at Quincy might be applied to the Susquehanna line, without much additional cost, but I submit to the board another plan, which appears to ensure equal stability.

Instead of the transverse bearings or sleepers of wood or stone upon which the parallel wooden rails are placed, it is proposed to substitute blocks of stone 18 inches or 2 feet square, inserted two feet deep in the ground, or more, as the nature of the soil may require, and these situated 8 feet apart, in the direction of the road. The blocks to be firmly embedded in broken stone and puddle, and so fixed as to rise from 4 to 6 inches above the surface of the ground. Upon the blocks will be placed the rail of oak timber 8 inches wide and 12 deep, and which will be secured to the former by iron bolts one inch in diameter and 20 inches long, the upper surface of the blocks being previously smoothed, drilled 10 inches and plugged with wooden trenails. Upon the inner edge of the wooden rail, will

be applied a rolled iron bar of $2\frac{1}{2}$ inches width, and $\frac{3}{8}$ of an inch in thickness, which will be secured in its place by spikes or screws, at every three feet in length. Parallel to this line will be the other at the distance of four feet.

As the road is calculated for a double track, the intermediate space between the two, will be four feet; and four sidellings or passing places to the mile, between the tracks, are allowed in the estimate. The side foot-paths will each occupy four feet, and the side drains are calculated at $4\frac{1}{2}$ feet in width. The space of ground covered by this arrangement will be about 33 feet. The horse path in each rail way will be properly prepared and covered with broken stone and gravel.

WESTERN DIVISION.

Item 1. Commencing with deep cut at gap of Mine ridge. Excavation on a base of 32 chains, depth from apex being 30 feet=68052 cubic yds. 20 cents	\$13610 40
Double drain=2816 cubic yds. 20 cents,	563 20
	<hr/>
	\$14173 60

Item 2. From Mine ridge to Aby's. Excavating 120 chains, area \times section $2\frac{1}{2}$ square yds.=6600 cubic yds. at 8 cents,	\$528 00
Single drain on 120 chains=5280 cubic yds. at 8 cents,	422 40
Embanking 8566 cubic yards at 15 cents,	1285 00
Three bridges; two of 66 feet and one of 33 feet	1740 00
	<hr/>
	\$3975 40

Item 3. From Aby's to Pequea creek at Ekert's. Excavation on $294\frac{8}{10}$ chains, \times section 6 sq. feet,	\$259 44
Double drain on 27.11 chains—single drain on $294\frac{8}{10}$ chains=15358 cubic yards at 6 cents,	921 48
Embankment on $28\frac{36}{100}$ chains=18135 cubic yards, at 15 cents,	2720 25
Two small bridges, each \$100	200 00
Bridge over Pequea creek; stone piers, wooden superstructure, and covered,	5487 00
	<hr/>
	\$9588 17

Item 4. From Pequea creek to M'Caslin's. Double drain on 119 chains=16472 cubic yards, at 6 cents,	\$628 32
Embankment on three chains=1489 cubic yards, at 10 cents,	148 90
Small bridge,	80 00
	<hr/>
	\$857 22

Item 5. From M'Caslin's to Weaver's. Excavating	
100 chains \times section—6 square feet=1466 cubic yards, at 6 cents,	\$87 96
Double drain on 36 chains; single drain on 100 chains=7568 cubic yards, at 6 cents,	454 08
Small bridge,	100 00
	<hr/>
	\$642 04
Item 6. From Weavers to Mill-creek. Excavating 60	
chains \times section—6 square feet=880 cubic yards, at 6 cents,	\$52 80
Double drain on $252\frac{8}{10}$ chains=22246 cubic yds. at 6 cents,	1334 76
Embankment on 24 chains=7150 cubic yards, at 10 cents,	715 00
Bridge over ravine near Mill-creek—covered,	5937 50
Bridge over Pequea creek; stone piers; covered,	6988 00
	<hr/>
	\$15028 06
Item 7. From Mill-creek to summit at Gilberts. Ex-	
cavation on 34 chains \times section $1\frac{1}{2}$ square yards=997 cubic yards, at 6 cents,	\$59 82
Cutting summit 34 chains base \times section 17 square yards=12716 cubic yards, at 10 cents,	1271 68
Double drain on 30 chains; single do. on 34 chains =5896 cubic yards, at 7 cents,	412 72
	<hr/>
	\$1744 22
Item 8. From Gilbert's to Beckerman's. Double	
drain on $155\frac{8}{10}$ chains=13710 cubic yds. at 6 cts.	\$822 60
Cut near Beckerman's \times section 17 square yards=6358 cubic yards, at 10 cents,	635 80
Side-long cutting on 12.89 chains \times section $6\frac{2}{3}$ square yards=1891 cubic yards, at 6 cents,	113 46
Embankment on 21.20 chains=3316 cubic yards, at 10 cents,	331 60
Embankment on 8.42 chains=5338 cubic yards, at 15 cents,	800 70
Two bridges; one of 33 feet and one of 10 feet	400 00
	<hr/>
	\$3104 16
Item 9. From Beckerman's to Big Conestoga. Double	
drain on 146 chains=12848 cubic yards, at 6 cts.	\$770 88
Cut 8 ft. on 22 chains base=7744 cubic yards, at 10 cents,	774 40
Embankment on 7 chains=2310 cubic yards, at 10 cents,	231 00
Bridge over Conestoga; stone piers, and wooden frames, covered; wooden superstructure,	22994 20
	<hr/>
	\$34770 48

Item 10. From Conestoga to Mayer's. Excavation on		
74.39 chains \times section; square feet 6=1091 cubic yards, at 6 cents,		\$65 46
Double drain on 61.61 chains; single do. on 74.39 chains=8695 cubic yards, at 6 cents,		521 70
Cut at Mayers' 27.57 chains base 3.97 ft. deep=8552 cubic yards, at 8 cents,		684 26
Small bridge,		80 00
		<hr/>
		\$1351 42
Item 11. From Mayers' to Sharp's. Cut in prolonga-		
tion of summit at Mayers' on 19 chains m. depth		
3.9 feet=5893 cubic yards, at 8 cents,		\$471 44
Double drain on 120 chains=10560 cubic yards, at 6 cents,		633 60
Embankment on 3 chains=763 cubic yds. at 3 cts.		79 30
Small bridge,		80 00
		<hr/>
		\$1261 34
Item 12. From Sharp's to Little Conestoga. Excava-		
tion on 120 chains \times section, 6 square ft.=1760		
cubic yards, at 6 cents,		\$105 60
Single drain on 120 chains=5280 cubic yds. at 6 cts.		316 80
Bridge over Conestoga; stone piers, wooden super-structure, covered,		6643 00
		<hr/>
		\$7065 40
Item 13. From Little Conestoga to end of section 9.		
Double drain on 78 chains=6864 cubic yards, at 6 cents,		\$411 84
Embankment on 2 chains=660 cubic yds. at 10 cts.		66 00
Small bridge,		80 00
		<hr/>
		\$557 84
Item 14. From section 9 to Habaker's. Double drain		
on 98 chains; single on 95 chains=12804 cubic yds.		
at 6 cents,		\$768 24
Excavation on 95 chains \times section, 6 square feet,		
1393 cubic yards, at 6 cents,		83 58
Cut at Mayers' 6331 cubic yards, at 10 cents,		633 10
Embankment and bridge near do.		672 00
do. do. near Leaman's		150 00
do. do. near Bean's		150 00
		<hr/>
		\$2456 92
Item 15. From Habakers to Senners'. Double drain		
on 30 chains; single do. on 68 chains=5632 cubic		
yards, at 8 cents.		\$450 56
Cut summit at Senners', 30 chains base, 13 ft. depth		
=19543 cubic yards, at 10 cents,		1954 30

Excavation on 68 chains \times section, 6 square feet=
997 cubic yards, at 6 cents,

59 82

\$2464 68

Item 16. From Senner's to Hershey's. Excavation on
61.87 chains, mean \times section=1.12 square yards,
=1524 cubic yards, at 6 cents,

\$91 44

Single drain on same=2723 cubic yards, at 6 cts.

1 3 38

Bridge over Hershey's pond; stone piers, wooden
superstructure and covered,

4193 00

\$4447 82

Item 17. From Hershey's to Seitz's.

Excavation on 63 chs \times section 1 sq yd=1,386 cubic
yards at 6 cents,

\$83 16

Double drain on 25. 66 chains and 63 chains single,
do=5,030 cub yds at 6 cts,

301 80

Cut at Seitz's 2,481 cub yds at 8 cts,

198 48

\$583 44

Item 18. From Seitz's to a point near Millingers.

Excavation on 89 chains \times section $1\frac{1}{2}$ square yards
=2,610 cubic yards at 6 cents,

\$156 60

Single drain along same=3,916 cub yds at 6 cents,

234 96

\$391 56

Item 19. From Millingers to Susquehanna river.

Excavation on 180 chs mean \times section=1.11 sq yds
=4,896 cubic yards at 6 cents,

\$263 76

Single drain along 180 chs=7,920 cub yds at 6 cts,

475 20

\$738 96

Susquehanna river section

Item 1. From Strickler's through Columbia to Chickes
rock—common, forming 160 chains

\$1000 00

Walling in river 1 mile 4225 perches at 75 cents,

3,168 75

Filling in do. 37. 46 cub yds at 10 cents,

3,754 60

Chickesalunga creek bridge, covered,

1,250 00

\$9,173 35

Item 2. From Chickesalunga to Marietta.

Double drain on 85. 49 chs 7,528 cub yds at 6 cts,

\$451 38

Small bridge,

120 00

\$571 28

Item 3. From Marietta to Vinegar's ferry road.

Double drain on 283 chs=23,144 cub yds at 8 cts,

\$1,851 52

Bridge at Longenecker's and embankment,

1000 00

\$2,851 52

Item 4. From Vinegar's ferry road to Conoy creek.

Excavation on 94.39 chs \times section 9-10 sq yd=1,863 cubic yards at 8 cents,	\$149 04
Double drain on 59 chs and single on 35 chs=5,732 cubic yards at 8 cents,	538 56
179.44 chs double drain=15,791 cub yds at 8 cents,	1,263 28
Four bridges, 2 of 20 and 2 of 10 feet	400 00
	<hr/>
	\$2,350 88

Item 5. Susquehanna river section, from Conoy creek to Bainbridge.

Rock excavation 1.88 chs=590 cub yds at 62 1-2 cts,	\$243 75
Cutting on 56 80 chs \times section 4 1-2 sq yds=5,623 cub yds at 20 cents,	1,124 60
Filling in and embanking 13.98=1,770 cu yds at 10 ct,	177 00
Dry wall on 13.21 chs=347 perches at 75 cents,	261 12
Paving on 8.45 chs=471 sq yds at 46 cents,	216 66
Back drain on 41 chs=1,04 cub yds at 15 cents,	270 60
Bridge across Conoy creek, covered,	720 00
	<hr/>
	\$3,012 83

Item 6. From Bainbridge to a point opposite Wood Island.

Excavating 48.09 chs \times section 3 1-4 sq yds=3,438 cubic yards at 18 cents,	\$618 84
Single drain on 35.87 chs=1,578 cub yds at 12 cts,	189 36
Dry wall on 48.09 chs=809 perches at 75 cents,	608 75
Paving 1 ch=51 sq yds at 46 cents,	23 46
2 bridges, 1 of 20 and 1 of 10 feet,	200 00
	<hr/>
	\$1,640 41

Item 7. From Wood island to York Haven road.

Excavation on 15.12 chs \times section 24 sq feet=887 cub yds at 8 cents,	\$70 96
Double drain on 146 56 chs=12,897 cub yds at 8 cts,	1031 76
Embankment on 1 ch=88 cub yds at 10 cents,	8 80
2 bridges, 1 of 185 feet and 1 of 24 feet,	1,750 00
	<hr/>
	\$2,861 52

Item 8. Susquehanna river section, from York Haven road to Hopkin's dam.

Excavation on 85.38 chs \times section 12-10 square yds=2,254 cubic yards at 18 cents,	\$405 72
Single drain along same=3,755 cub yds at 18 cts,	675 97
3 bridges, 2 of 10 and 1 of 20 feet,	320 00
	<hr/>
	\$1,401 69

*Eastern Division.***Item 1. From Mine ridge to Moore's mill pond.**

Excavation on 179 chs=3,329 cub yds at 6 cents,	\$199 74
Double drain on 57 chs, single on 179 chs=7,876 cub yds at 6 cents,	472 86
Four bridges of 10 feet,	320 00
Bridge at Moore's, stone piers and covered,	6,375 00
	<hr/>
	\$7,367 60

Item 2. From Moore's to Cloud's.

Excavation on 128.26 chs. mean \times section 1 9-10 sq yd. =5,362 cubic yards at 6 cents,	\$421 72
Single drain along do=5,644 cub yds at 6 cents,	338 64
Embankment on 3 chs=330 cub yds at 10 cents	33 00
Slope wall on 54.68 chs=927 perches at 75 cents,	695 00
Four bridges of 10 feet,	320 00
Bridge at Cloud's, wooden frame upon stone founda- tion, wooden superstructure and covered,	4,375 00
	<hr/>
	\$6,083 36

Item 3. From Cloud's to Octoraro summit.

Excavation on 223 chs \times section 1 1-3 sq yds=6541 cubic yards at 6 cents,	\$392 40
Single drain along do.=9,820 cub yds at 6 cents,	588 72
Embankment on 7 chs=1,560 cub yards at 10 cents,	156 00
Cut summit 10.23 feet, base 20 chains=9,566 cubic yards at 10 cents,	955 90
	<hr/>
	\$2,093 02

Item 4. From Octoraro summit to Buck run summit.

Excavation on 226.76 chs \times section 1 sq yd=4,988 cub yards at 6 cents,	\$299 28
Embankment on 5.70 chs=1,791 cub yds at 10 cts,	179 10
Single drain on 227.70 chs=9,079 cub yds at 6½ cts,	598 56
Cut sum't base 23 chs 30 ft=48,913 cu yds at 20 ct,	9,782 60
Bridge over branch of Buck run at Park's,	300 00
Bridge over Buck run, covered,	8000 00
	<hr/>
	\$19,159 54

Item 5. From Buck run summit to West Brandywine,

Excavating 243.41 chs=20,365 yds at 8 cents,	\$1,629 20
Embankment on 11 chs=2,837 c yds at 10 cents,	283 70
Single drain on 243.41 chs=10,710 c yds at 8 cts,	856 80
Slope wall on 22.75 chains=978 perches at 75 cts,	733 50
5 bridges, 66, 33, 33, 20 and 10 feet,	1,650
Bridge over West Brandywine, stone piers, wood- en superstructure and covered,	17,790
	<hr/>
	\$22,943 20

Item 6. From West Brandywine to Gardner's ridge.

Excavation on 146.38 chs \times 14 sq feet = 5,008 cubic yards at 6 cents,	\$300 48
Cut at Gardner's ridge 3.55 feet 4 chains base = 547 cubic yards at 8 cents,	43 62
Single drain on 16.33 chains, double do on 4 chains = 6,790 cubic yards at 6 cents	407 40
	<hr/>
	\$751 50

Item 7. From Gardner's to East Brandywine.

Excavation on 450.10 chains \times section $2\frac{1}{2}$ sq yards = 24,755 cubic yards at 6 cents,	\$1,435 36
Single drain on do 19,804 c yards at 6 cents.	1,188 24
Embankment on $\frac{1}{2}$ chs = 660 c yards at 10 cents,	66
Bridge over Beaver creek, covered,	5,724
Bridge over Brandywine, stone piers, covered,	13,405
	<hr/>
	\$21,868 54

Item 8. From East Brandywine to Trimble's Saw mill.

Excavation on 355.34 chains \times section 14 sqr feet = 12,160 cubic yards at 6 cents,	\$729 60
Single drain along do 15,634 cubic yds at 6 cents,	938 04
Embankment on 5.50 chs = 2,645 c yds at 10 cents,	264 50
Small bridge over Robert's run,	200
do over Valley creek at Trimble's,	300
	<hr/>
	\$2,432 14

Item 9. From Trimble's mill to summit near White Horse.

Excavation on 225.50 chains \times section 2.8 sqr yards = 13,953 cubic yards at 6 cents,	837 18
Single drain on do = 9,965 cubic yards at 6 cents,	597 96
	<hr/>
	\$1,435 14

Item 10 From White Horse to Academy summit.

Excavation on $92\frac{1}{2}$ chains \times section 6 sqr feet = 1,356 cubic yards at 6 cents,	\$81 36
Single drain on do 4,070 cubic yards at 6 cents,	244 20
Bridge 33 feet,	500
	<hr/>
	\$625 56

Item 11. From Academy to Warren Tavern.

Cut at Academy summit 15 feet base 20 chains = 15,765 cubic yards at 15 cents,	2,364 75
Sidelong excavation on 176 chains \times section 1 square yard = 3,872 at 6 cents,	232 32
Two bridges 33 feet each,	600
Double drain on 20 chains, single on 176 chains = 9,504 cubic yards at 9 cents,	855 36
	<hr/>
	\$4,052 43

Item 12. From Warren to Howel's Ravine.

Excavation on 229.69 chains \times section $8\frac{1}{4}$ sqr feet=	
4,637 cubic yards at 6 cents,	278 22
Single drain on do=10,106 cubic yds at 6 cents,	606 36
Embankment on $9\frac{1}{4}$ chains=2,717 c yds at 0 cts,	271 70
Six bridges of 66, 25, 150, 150, 25, and 25 feet	5,340
Bridge over ravine at Pennington's,	6,900
do over do at Howel's,	6,114

\$19,590 28

Item 13. From Howel's to Grover's.

Excavation on 363 chains=7,421 c yds at 6 cts,	\$445 26
Single drain on do 16,191 c yds at 6 cts,	971 46
Embankment on 6 chs=1,860 c yds at 10 cts,	186
Three bridges,	4,400

\$6002 72

Item 14. From Grover's to Mauld's ravine.

Excavation on 101 chains \times section 6 sqr feet=1,481	
cubic yards at 6 cents,	\$88 86
Single drain on 101 chs=4,444 c yds at 6 cts,	266 64
Bridge over Mauld's ravine, covered,	7,500

\$7855 50

Item 15. From East side Mauld's ravine to summit at Rudolph's.

Excavation on 138 chs=3,343 c yds at 6 cts,	200 58
Cut at Rudolph's 20 feet base 35 chs=41,177 cubic	
yards at 20 cents,	8,235 40
Single drain on 138 chains, double do on 35=9,112	
cubic yards at 10 cts,	911 20
Embankment on $6\frac{1}{2}$ chs=3,893 c yds at 15 cts,	583 95
Bridge 33 feet,	320

\$10,250 93

Item 16. From Rudolph's to end of section 35 as described in the preliminary report.

Double drain on 582 chs=51,216 c yds at 6 cts,	\$3,072 96
Embankment on 2 chs=1,670 c yds and bridge,	1,570 50
2 bridges of 10 feet with 6,020 cubic yards, embank-	
ment,	1000

\$5,643 46

Summary of the estimate for common road forming on the Susquehanna river section, including bridges and embankment.

Item 1 From Strickler's to Chickesalunga creek,	\$9,173 35
2 Chickesalunga to Marietta,	571 28
3 Marietta to Vinegar ferry road,	2,851 52
4 Vinegar ferry road to Conoy creek,	2,350 88
5 Conoy creek to Bainbridge	3,012 83

6	Bainbridge to a point opposite Wood Island,	1,640 41
7	Wood Island to York Haven Road,	2,861 52
8	York Haven road to Hopkin's dam,	1,491 69

\$23,863 48

Average cost per mile, the distance being 15½ miles, \$1,515 14

SUMMARY

Of the estimate for common road forming on the Western Division (beginning at Susquehanna) including bridges, embankments and cuttings.

Item 19.	From the Susquehanna river to Millinger's	\$ 738 96
18	Millinger's to Seitz's	391 56
17	Seitz's to Hershey's	583 44
16	Hershey's to Senner's	4447 82
15	Senner's to Habacker's	2464 68
14	Habacker's to station No. 9	24 6 92
13	Station No. 9 to L. Conestoga	557 84
12	L. Conestoga to Sharp's	7065 40
11	Sharp's to Mayer's	1261 34
10	Mayer's to Big Conestoga	1351 42
9	Big Conestoga to Beckerman's	24770 48
8	Beckerman's to Guilbert's	5104 16
7	Guilbert's to Mill creek	1744 22
6	Mill creek to Weaver's	15023 06
5	Weaver's to M'Caslin's	642 04
4	M'Caslin's to Pequea creek	857 22
3	Pequea creek to Aby's	9588 17
2	Aby's to the Gap	3975 40
1	Deep cut at the Gap	14173 60

EASTERN DIVISION.

1	From the Gap to Moore's	7367 60
2	Moore's to Cloud's	6083 36
3	Cloud's to Octararo summit	2093 02
4	Octararo summit to Buck run summit	19159 54
5	Buck run summit to W. Brandywine	22943 20
6	W. Brandywine to Gardner's	751 50
7	Gardner's to E. Brandywine	21868 54
8	E. Brandywine to W. Valley creek	2432 14
9	W. Valley creek to summit at W. Horse	1435 14
10	Summit at W. Horse to Academy summit	625 26
11	Academy summit to the Warren	4052 43
12	Warren to Howel's	19590 28
13	Howel's to Grover's	6002 72
14	Grover's to Mauld's	7855 50

15	Mauld's to summit at Rudolph's	10250 93
16	Rudolph's to section 35	5643 46

Total amount of cost of road from Columbia eastward \$233,357 35
 The distance being 84½ miles, the average cost per mile is \$2761 67.

Estimate for one mile of double railway.

Rolled iron bars of 2½ inches wide by ⅜ of an inch in thickness, are considered sufficient for plating the inner edge of the wooden rails. For the double track including sidelings or crossing places, one mile will require 30.5 tons, which can be drilled and delivered at \$93 per ton	\$2841 15
Stone blocks (granite, gneiss or limestone) from 18 inches to 2 feet square, and from two and a half to three feet long, placed eight feet apart, embedded, drilled and plugged, at 75 cents each	\$2062 50
22000 feet oak timber 8 by 12 inches to be placed as rails upon the blocks, including sidelings at 8½ cts. per foot	\$1870 00
Iron bolts 20 inches by 1 in diameter, for fixing the wooden rails to the stone blocks, at \$1.50 per ton,	773 40
Five inch spikes for securing the iron bars to the wooden rails, including the placing at 9 cents per pound,	182 48
Stoning the horse path—There are many miles where the gravel side hills will render this expense unnecessary; but in taking the mean average and giving an increment of length to the sidelings; both will cover all expenses incident to the public and farm roads crossing the line of railway, and in filling up the slopes and counter slopes of the sidelings,	350

Total cost for 1 mile, \$8,079 53

Estimate of the Susquehanna River section.

15.64 miles requiring 477.8 tons of bar iron, at \$93 per ton,	\$44,435 40
do do 344,080 feet oak timber at 8½ cents per foot,	29,246 80
do do 43,000 blocks of stone at 75 cents each,	32,257 50
do do 80.6 tons of bolts at \$1.50 per ton,	12,090 00
do do 31,712 lbs of spikes at 9 cents per lb,	2,854 08
do do Stoning and preparing the horse path at \$350 per mile,	5,474 00

\$126,357 78

Bridges.

501 feet of double and 100 feet of single bridges, re-			
quiring 4.8 tons iron,		\$379 44	
do	do	2,204 feet oak timber at 18	
		cents,	187 34
do	do	Iron fastenings for timber,	30 00
do	do	203 lbs spikes at 9 cts. per lb,	18 27
			<hr/>
		\$126,972 83	
Add cost of road forming,		23,863 48	
			<hr/>
		\$150,836 31	
Add for contingencies 10 per cent,		15,083 63	
			<hr/>
		\$165,919 94	
			<hr/>
Average cost per mile		\$10,534 59.	

Estimate of the Eastern and Western divisions, between Susquehanna and Schuylkill, exclusive of bridges.

83.56 miles requiring	2,552 $\frac{3}{4}$ tons bar iron at \$93	\$237,405 74
do	do 229,790 blocks of stone at 75 cents each,	172,342 50
do	do 1,838,321 feet oak timber at 8 $\frac{1}{2}$ cents per foot,	156,257 28
do	do 430.85 tons bolts at \$150 per ton,	64,627 50
do	do 169,422 lbs spikes at 9 cents per lb.	15,247 98
do	do Stoning the horse path \$350 per mile,	29,246 00
		<hr/>
		\$675,127 00
Stationary steam engine near Millinger's,		6,000 00

Bridges.

0.55 miles of double and 1.55 miles of single tracks,			
		38 tons bar iron,	3,534 00
do	do	27,054 feet oak timber at $8\frac{1}{2}$ cts.	2,299 59
do	do	Iron fastenings for rails,	375 00
do	do	2,595 lbs spikes at 9 cts.	233 55
			<hr/>
			\$687,569 14
Cost of road, &c.			233,357 35
			<hr/>
			920,926 49
Add 10 per cent. for contingencies,			92,092 64
			<hr/>
			\$1,013,019 13
Average cost per mile,			<u>\$11,824.66</u>

All the bridges under 150 feet in length of platform, are calculated for double railway tracks in the estimate.—The bridge over big Conestogo is also double, on account of its length;—all the others have only single: but their breadth of platform which is 18 feet, will admit of having a double line of road, if deemed necessary.

Various estimates have been given of a horse's power of traction. Mr. Watts estimates the force of a horse's traction, at 150 lbs. when the horse goes at the rate of $2\frac{1}{2}$ miles an hour, and Mr. Treadgold gives it at 125 lbs, when the velocity is 3 miles an hour for 6 hours of a day: but neither of these estimates appear to be the result of actual experiment. Making due allowance for the difference in the strength of horses, in the different places where the experiments were made, would scarcely account for the discrepancies in these statements. The results of experiments made by Mr. Wood, of the performance of horses, and exhibited in the tables in his treatise on rail-roads, are much more satisfactory. Taking the force of a horse's traction, travelling twenty miles per day, at the rate of 2 miles an hour, to be equal to 112 lbs. may be considered as a correct estimate of his power. Mr. Wood derives also from a number of experiments, satisfactory coincidence of the amount of the friction of carriages moving upon Edge rails: the result is that with wheels, of which the ratio of the diameter to that of the axle is 12:1, the total resistance will be .02 part of the weight of the whole carriage and load.—

If the friction of this carriage be taken at the 200th part of its weight, then the weight which will present a resistance of 112 lbs. upon the edge rail will be 22,400 lbs. or ten tons, conveyed on a level rail road, twenty miles per day, travelling at the rate of 2 miles per hour. This expresses only the relation of the effort to the effect on a level—on ascents the resistance is increased, and the effect of the effort of the moving body must be considerably diminished. In the theorems given by recent writers on this subject, the weight of the moving power which had been heretofore omitted by Treadgold and others, is considered as bearing too great a proportion to the whole load, to be neglected in the equation.

In calculating the value of the performance of a horse on the varied ascents from the Susquehanna river to Schuylkill, the amounts of tonnage stated in the table forming a part of this report, and which are placed opposite to each ascending graduation, are deducted from the following formula, which may be applied in calculating the effect of either the locomotive engine or horse power.

In comparing the results obtained for the latter, with some of the experiments specified in Mr. Wood's tables, they are found to represent the effect of the power of the horse, as below the actual performance.

First for the engine—let E represent the weight of the engine, and e be that fractional part of its weight, which produces the pro-

gressive motion of the engine wheels upon the rails: then E . e . will represent the engine's force of traction upon the level.

Let I be the angle of inclination.—

W the weight of the wagons and load.

f the friction at the axle of the wagons, when the pressure is 1.

d the diameter of the wheel when that of the axle is 1.

The general equation which expresses the relations of these quantities, is $E (e \pm \sin I) = W (f \div d \pm \sin I)$.

The upper signs give the equation for ascending slopes, and the lower that required for descending slopes.

Taking an ascending graduation of $27\frac{1}{2}$ feet to the mile, and which may be considered as the highest number on our line; the amount of tonnage which a locomotive engine can drag up this ascent, may be formed thus:

Let E be taken = 7 tons. By Mr. Wood, $e = \frac{1}{23}$ and $f \div d = \frac{1}{300}$: sine of $I = \frac{1}{192}$ ($27\frac{1}{2}$ to the mile) then $7 (\frac{1}{23} - \frac{1}{192}) = W (\frac{1}{300} + \frac{1}{192})$.

$\frac{7}{23} - \frac{7}{192} = \frac{1169}{4800} = W \frac{392}{38400}$: and $W = 23.9$ tons, which the engine can drag up an ascent of $27\frac{1}{2}$ feet to the mile.

If the effort of a horse at any velocity, be represented by 1-10th of his weight, or 112 lbs. he will, on a level, drag twenty times his weight, or ten tons: and the inclination at which his load, with the same velocity, ought to be one half, or only ten times his weight, is $\frac{1}{20}$, or 25.63 feet to the mile. Taking the maximum rate of graduation as before, at $27\frac{1}{2}$ feet to the mile, the amount of tonnage corresponding to this ascent, is found to be as follows:

The effort of a horse in carrying a load, is assumed to have to his power of traction, the ratio of 3 to 1: or sine $\frac{1}{3}$, is substituted for sine 1, in the first number of the equation.

Using the upper signs, the equation is H or 1120 ($1-10$ —sine $\frac{1}{3}$) = $W (\frac{1}{200} + \frac{1}{192})$.

$112 - \frac{1120}{376} = W \frac{392}{38400}$ and $W = 107,809$ lbs. = 4.81 tons.

By a slight modification in the same formula, it can be applied in ascertaining the most advantageous inclination which a rail road ought to have, when the amount of transportation in going and returning, bears a known proportion. It is unnecessary, however, to give it a place in this report, as the surface over which our line passes, will prevent the application of it.

TABLE exhibiting the distance, ascending and descending graduations, commencing at the Susquehanna river, and tracing the line eastward.

WESTERN DIVISION.

Chains.	Graduation pr. mile Ascending.	Graduation pr. mile Descending.	Amount of tonnage, or value of the power of one horse on the as- cents, as derived from the equation $W (e - \sin 1 \times 3) = W (f \div a - \sin 1.)$
8	85.35	3.12	
7	147.56	2.56	
6	84.96	Level.	$W = 20 \text{ H} = 10 \text{ tons}$
5	78.25	Level.	Do.
4	273.53	1.56	
3	265.66	1.04	
2	85.49	3.84	
1	240.00	Level.	In passing Chickeys rock, this to be hereafter graduated
19	160.00	18.00	Sine inclination = $\frac{1}{293}$: load 5.95 tons
18	20.00	130.00	Fixed engine, length of plane hereafter regulated
17	89.00	13.68	Sine I $\frac{1}{385}$: load 6.55 tons
16	83.06	16.16	
15	66.33	5.19	
14	98.00	18.00	
13	213.00	16.8	
12	80.00	27.33	
11	120.00	18.16	Sine I $\frac{1}{292}$: load 5.85 tons
10	123.00	0.87	
9	136.00	21.12	
8	146.00	27.50	Sine I $\frac{1}{192}$: load 4.81 tons
7	186.00	7.18	Sine I $\frac{1}{753}$: load 8.35 tons
6	84.00	18.08	
5	281.00	13.84	Sine I $\frac{1}{381}$: load 6.45 tons
4	136.00	7.35	Sine I $\frac{1}{717}$: load 7.78 tons
3	122.00	Level.	$W = 20 \text{ H} = 10 \text{ tons}$
2	340.00	27.50	Sine I $\frac{1}{192}$: load 4.81 tons
1	162.00	29.04	Sine I $\frac{1}{191}$: load 4.66 tons

EASTERN DIVISION.

1	235.00	20.32	
2	131.26	16.00	Sine I $\frac{1}{336}$: load 6.61 tons
3	23.37	7.92	Sine I $\frac{1}{666}$: load 7.65 tons
4	242.66	23.04	
5	257.00	27.50	
6	150.33	Level.	$W = 20 \text{ H} = 10 \text{ tons}$

7	458.00		16.24	
8	361.64	12.34		Sine I $\frac{1}{427}$: load 6.76 tons
9	226.50	10.82		Sine I $\frac{1}{311}$: load 7.14
10	93.50	23.20		Sine I $\frac{1}{227}$: load 5.23
11	199.00		12.56	
12	260.00		2.32	
13	380.00	15.25		Sine I $\frac{1}{348}$: load 6.26
14	110.00		23.00	
15	176.00	9.97		Sine I $\frac{1}{329}$: load 7.25
16	602.00		15.48	

84 miles 48 chns

There are three points upon the line between Mine Ridge and Schuylkill river, where stationary steam power could be advantageously placed. There are at the Gap, on Mine Ridge, the summit between West Brandywine, and at a point about a mile north west of the Spread Eagle tavern, on the Philadelphia turnpike. Not only would the line be shortened $2\frac{1}{2}$ miles, and the gradations from these positions be diminished, but the saving in expense in the first cost of the railway, would amount to about fifty thousand dollars. I am not, however, at present prepared to say, whether this difference of cost, would be an equivalent to that of maintaining and keeping in repair, the steam engines. This will form a subject for consideration and calculation upon the location of the road.

In tracing the lines as detailed in the different sections in the preliminary report submitted to the board, the operation was so conducted as to render the expense of forming the road, a moderate one.

In some instances, embankments and cuttings were avoided, the expense of which, however, in the actual location, would have been equivalent to the increased length of railway.

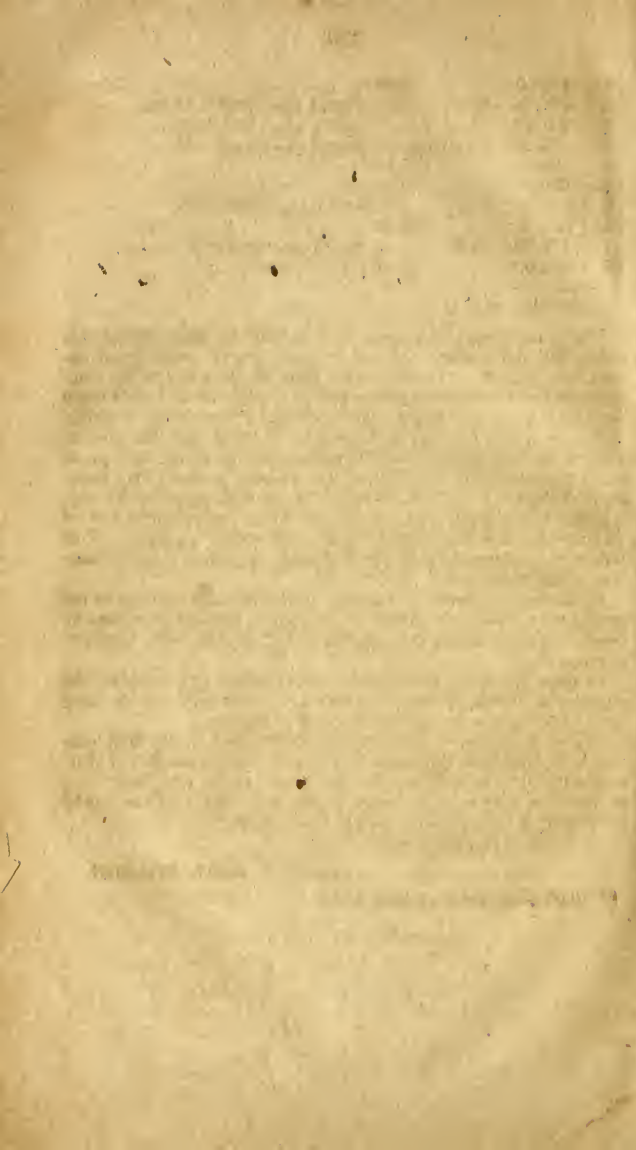
I have, therefore, no hesitation in saying that in the final location of the line from Columbia to Philadelphia, the amount of distance derived, in adding together the lengths of the various sections in the table, may be considered as the true length of the line of railway from Susquehanna to Schuylkill rivers.

All which is respectfully submitted.

[Signed]

JOHN WILSON.

Philadelphia, January 12th, 1828.



~~canal, to be constructed at the expense of the state, and to be styled the Pennsylvania canal. I have the honor to transmit a report of the settlement of the accounts of the canal commissioners.~~

~~With great respect.~~

~~Your o^bl. servant.~~

DAVID MANN.

*Hon. Ner Middleswarth, Esq. Speaker of the
House of Representatives.*

No. 233.

Report of the settlement of the accounts of the canal commissioners.

DR.

To balance on account settled 20th February, 1827,	\$33,501 35½
To amount received by the treasurer of the board of canal commissioners, from the commissioners of the internal improvement fund,	1,140,000 00
	<u>\$1,173,511 5½</u>

CR.

By disbursements by Charles Mowry, Esq. acting canal commis-
sioner, Eastern and Susquehanna Division, viz:

Paid contractor on section No.	3	\$16,458 58
do	4	170
do	5	3,517 83
do	6	2,312 85
do	8 & 9	29,059 03
do	10	2,838 51
do	11	3,733 03
do	12	2,477 70
do	13	2,945 73
do	14 & 15	27,319 83
do	16	4,146 84
do	17	1,840 29
do	18	2,629 56
do	19	258 89
do	20	741 44
do	21	1,633 36
do	22	2,777 68
do	23	1,645 51

Paid contractors on section No. 24		\$3,494 89
do do 25 & 26		3,866 09
do do 27 & 28		5,686 64
do do 29		1,597 56
do do 30		900
do do 31		1,689 48
do do 32		2,700 65
do do 34		367 95
do do 35		1,301 18
do do 36		2,006 66
do do 37		4,520 48
do do 38		179 82
do do 39		911 71
do do 40		1,501 40
do do 41		1,551 73
do do 42		1,311 11
do do 43		1,211 05
do do 44		1,276 14
do do 45 & 46		3,939 03
do do 47		2,874 26
for repairing canal, 28 to 51		305

\$149,739 32

LOCKS.

Paid contractor, on guard lock, No. 1		\$1,200 00
do do 2		6,791 41
do do 3		9,047 17
do do 4		10,545 83
do do 5		11,403 24
do do 6		9,158 62
do do 7 and 8		7,947 08
do regulating lock on section 47,		7,339 61

63,432 96

AQUEDUCTS.

Paid contractor, on aqueduct on sec. 31		9,002 46
do do 16		5,281 81
do do 40		2,630 75
do do 52		1,530 25
do do 13		1,406 05

19,851 32

do excavation at aqueduct on section 16

101 84

CULVERTS.

Paid contractor on culvert on sec. 11, 12		80 00
do do 16		340 40
do do 20		84 64

Paid contractor, on culvert on sec.	19	\$182 76
do do	29	109 00
do do	30	378 25
do do	35	325 63
do do	32	3 85
do do	37	295 21
do do	47	371 88
do do	42	501 91
do upper,	29	671 00
do lower,	do	150 00
do do	41	65 00

\$ 3,559 53

DAMS.

Paid contractors on dam at section 1, 875 60

PROTECTION WALL.

Paid contractor on wall on section 32, 154 00

BRIDGES.

Paid contractors for bridges 1 to 12, inclusive,	4,020 64
do painting do do	110 00
do bridge No. 21	786 25
do do 22-3-24	2,211 50
do do 26-7-23	1,679 95
do do 29 to 35, inclusive,	2,313 92
do do 36 to 44 do	2,539 80
do do 13 to 30 do	
do wood work,	1,229 00
do do 13 to 20, inclusive,	
do stone work,	3,061 25
do bridge on section No. 20,	
do at Clark's creek,	530 70
do bridge No. 28, stone work,	744 35
do do do wood work,	475 00
do do do coping,	15 00
do do do embankment,	42 00
do do 35 do	38 69
do do 8 do	171 60
do do 23 excavation,	711 88
do do 22 do	320 50
do do 10 do	2 00
do do do embankment,	520 00
do do 11 do	587 50
do do 13 excavation,	120 96
do do 14 do	104 44
do do 19 20 embankment,	773 70
do do 21 do	811 25

Paid contractor for bridge No. 33	embankment,	\$58 65	
do	do 17	do	348 16
do	do 16	do	436 00
do	do 6	do	56 14
do	do 18	do	190 40
do	do connected with No. 18	193 50	
do	do 24	embankment,	511 75
do	do 36 37	do	265 05
do	do 2	do	106 50
do	do 24		633 60
do	do	do embankment,	474 25
do	do	do at Wetzel's	
		swamp,	26 00
do	do 30	embankment,	205 65
do	do 41 42	do	299 40
do	do 29	do	124 05
do	do 35		64 18
do	do 39		64 80
do	do 48		144 00
do	do 44		657 90
do	iron for bridges,		1,404 05
do	cast iron for do and locks,		450 00
George Pattison for	sundries for bridges,		38 15
			<hr/> \$30,274 36

BASINS.

Paid contractors for bason on section 28	\$1,426 75	
do do do 47	2 5 20	
		<hr/> 1,691 95

ROADS.

Paid on contract for turnpike road on sect. 41	520 00	
do for roads to lots on sect. 31	15 00	
		<hr/> 535 00

FENCES.

Paid Isaac M'Cord, contractor	\$6,350 28	
John B. Cox, do	350	
Robert Harris, do	55	
Jacob Rinehart, do	27	
Joseph Corbett, do	80	
		<hr/> \$6,862 28

SUSQUEHANNA LINE.

Paid contractors on section No. 3	\$709 40	
do do 4	534 44	
do do 5	800 66	
do do 6	1,053 64	
do do 7	1,218 88	

Paid contractors on section No.	8	\$972 55
do	10	216 00
do	11	2,627 55
do	12	2,228 50
do	13	2,246 37
do	14	579 96
do	15	1,750 49
do	16	182 00
do	17	73 60
do	18	871 34
do	19	6,846 18
do	20	1,523 11
do	21	1 9 81
do	22	567 05
do	23	778 68
do	24	322 40
do	25	541 33
do	26	94 00
do	27	496 30
do	28	140 50
do	29	520 60
do	30	185 60
do	31	271 86
do	32	121 60
do	33	1,000 57
do	34	40 00
do	35	125 15
do	36	228 00
do	37	506 95
do	38	160 00
do	39	279 80
do	40	701 64
do	41	752 37
do	42	281 52
do	43	312 65
do	44	164 23
do	45	718 62
do	46	609 26
do	47	575 54
do	48	203 52
do	49	631 85
do	50	250 00
do	51	3 6 64
do	52	721 44
do	53	175 05
do	54	3 2 20
do	55	88 00
do	56	654 42
do	57	999 91
do	58	244 61

Paid contractors on section No. 59	\$ 1,259 59	
do do 60	173 28	
do do 61	459 11	
do do 63	271 26	
do do 64	1,067 93	
do do 65	328 21	
do do 66	104 00	
do do 67	110 00	
do do 68	876 12	
do do 69	56 00	
do do 70	223 49	
do do 71	484 87	
do do 75	90 00	
	<hr/>	[\$46,763 69

LOCKS:

Paid contractor for lock No. 6,	326 72	
	<hr/>	326 72

DAMS.

Paid contractor on dam on section No. 63,	750	
	<hr/>	750

CULVERTS.

Paid contractors on culverts on sections No. 25 and 59,	28 80	
	<hr/>	28 80

BRIDGES.

Paid contractor on bridges from section 3 to 27,	50 20	
do do 28 to 38	400 78	
	<hr/>	451 98

DAMAGES, &c, AMICABLY SETTLED.

Paid John Buffington, for a stable,	\$30	
do do crop, &c,	20	
Amos Grist, for removing a stable,	15	
Henry Beader, for copper pipe to convey water from C. Gross' spring,	27	
Zeigler and Lingle, for removing fence, &c.	75	
Peter Keller, do do	2 35	
Fisher and Douglas, counsel in damage cases,	400	
William M'Clure, for stoppage of mill,	100	
J. B. Thompson, copper pipe for Boy- er's spring,	29	

Amos Grist, for rebuilding a stable,	\$ 23 50	
George Parson, for farm, &c.	1,789 50	
Peter Brenner,	600	
John Steinman, for procuring releases,	100	
Amos Grist, removing house and re- building,	145	
Martha Peacock for crop,	8	
Robert Harris, do	15	
John B. Cox, do	20	
George Banford,	20	
William Grimshaw, for crop,	10 06	
Samuel Douglas, counsel,	25	
Christian Gross damages recovered in court,	698 50	
Henry W. Snyder, damages,	1500	
Lewis Dewart, do	18	
	<hr/>	5,670 91

ENGINEER DEPARTMENT.

Services, &c. rendered prior to the 7th May, 1827.

aid William Strickland, salary,	\$692 25	
do personal expenses,	670 35	
do paid to sundry hands,	164 95	
	<hr/>	1,527 55
F. W. Rawle, assistant en- gineer, salary,	276	
do personal expenses,	537 60	
do paid to sundry hands,	92 04	
	<hr/>	905 64
S. H. Kneass, per diem pay,	550 50	
George Merrick, do	490	
Emerson M'Ilvaine, do	369 50	
Robert Farries, do	368	
W. B. Norris, do	481	
do expenses to Phil- adelphia,	29 66	
	<hr/>	510 66
C. L. Schlatter, per diem pay,	377	
Wm. Rodrigue, do	380	
William Groves, superintendent, per diem pay,	935 64	
Walter Bell, axeman do	66	
John M'Neely, do	15	
	<hr/>	6,490 49

Contingent.

Charles Mowry, acting canal commis- sioner, per diem pay,	210 89	
	<hr/>	6,701 38

Services, &c. rendered subsequent to 7th May, 1827.

Paid S. H. Kneas—\$1 per deim, pay,	\$348 00	
George Merrick, do	348 00	
Emerson M'Ilvaine, do	258 00	
Robert Harries, do	286 50	
C. L. Schlatter do	196 50	
William Rodrigue, do	346 00	
W. F. Baker, do	36 00	
H. Hagi, do	332 00	
F. H. Petrie, do	332 00	
J. A. Buyers, do	266 00	
James Warford, do	253 50	
Franklin Wright, do	253 50	
J. H. Hopkins do	169 50	
Simeon Guilford, payments to sundry hands,	413 50	
William Groves, superintendant,	516 00	
	<hr/> <hr/>	4,355 00

MISCELLANEOUS.

Paid Mitchell, & Co. for patterns	\$ 78 25	
J. W. Kane, paint brushes,	00 75	
F. Searfos,	38 00	
Thomas Wallace for wagon and horses,	131 50	
J. L. Ayres, do do	15 00	
Thomas Wallace, boarding axeman,	5 00	
Oglesby and Pool, tape measures, &c.	16 25	
S. Sprigman, blank book, &c.	7 62	
George Merrick, sundries,	16 44	
P. Stancliff, for levelling instruments,	225 50	
Mitchell, & Co. patterns,	66 50	
Henry M'Gowan,	2 50	
A. Graydon,	3 08	
John Wyeth, sundries,	55 50	
John Mitchell,	13 50	
G. J. Heisley,	6 37	
J. Nevins,	1 00	
Blanchard, Haley and Beatty,	3 50	
P. Fessler,	10 00	
W. Rodrigue,	31	
	<hr/> <hr/>	696 57

CONTINGENT.

Paid John Elder, for office rent,	\$ 50 00	
For office furniture,	17 27	
For printing,	6 50	
Sundry persons for fuel, &c.	29 81	
do for cleaning office,	9 37	
For stationary, &c. &c. for canal office,	108 18	

Paid Postage,	\$59 34	
Sol. Sprigman,	35 12	
Sundries,	8 64	
For printing,	252 06	
Charles Mowry, acting canal commis-		
missioner, per diem pay,	\$755 11	
F. W. Leopold, clerk,	431 00	
	<hr/>	1,761 90
		<hr/>
		\$344,585 11

By disbursements by Abner Lacock, Esq. acting canal commis-
sioner western division, viz:

On old line from the 1st to the 92nd section.

Paid contractors on sections No. 1, 59	
and 79,	\$ 5,128 63½
do on sections No. 2, 6, 37, 40,	
54, 60, 61, 65, and 66, and on	
lock No. 5, and aqueducts over	
Bull and Deer creeks,	25,770 00
Contractor on section No. 3,	865 17
do do 4	95 00
do Nos. 5, 30, 64 and 89,	1,700 00
do No. 7,	3,944 21
do Nos. 8 and 25 }	
and on locks No. 3 and 4, }	13,595 19
Contractor on sect No. 9, 28 & 48,	10,240 86
do do No. 10, and	
aqueduct over Squaw run,	11,371 83
Contractors on sections No. 11,	
32, 38, 71, 72 and 80, and cul-	
vert on section No. 75,	17,389 45
Contractor on section No. 12	6,410 00
do do 13	4,373 00
do do 14	5,430 61
do do 15	4,492 28
No. 16 and culvert on do	1,364 00
do do No. 17	1,234 43
do No. 18 and 41	3,688 77
do do 19	1,561 77½
do do 20 and 81	4,149 00
do do 21	267 00
do do 22	546 00
do do 23	101 00
do do 24	585 00
do do 26	1,620 00
do do 27	716 00
do do 29	400 33
do do 31	117 10

Paid contractor on No. 33, 34, 52 & 88	\$ 714 52½
do do 35, 67 and 68	6,829 37½
do do 39	916 64
do do 36	1,550 80
do do 42	7,020 00
do do 43	5,490 00
do do 44	5,434 95½
do do 45	2,860 00
do do 46	3,529 38
do Nos. 47, 49 and 50	6,382 00
do Nos. 51, 53, 55, 91 & 92, and timber for bridges & fences }	4,600 00
Contractor on sect's. No. 56, 57 and 58,	3,250 00
do do 62 and 74	3,225 95
do do 63	70 00
Nos. 69 and 70	6,820 00
No. 73 and culvert on do	7,007 57½
do do No. 75	870 00
do do 76	7,979 63
do do 78	85 00
do do 82	583 20
do do 83	1,143 00
do do 84	12 43
do do 85	12 43
do do 86	80 77
do do 90	1,640 40
do do 77	489 06

\$ 205,753 76

HILL SLIPS.

Paid contractor on section No. 12	1,085 00
do do 11	720 00

1,805 00

LOCKS AND AQUEDUCTS.

Paid contractor on lock No. 21, and aqueduct over Buffalo creek, Foster and Bole, contractors,	\$10,270 00
John Moore, cont'r. lock No. 2,	2,800 00
Lebarron and Lothrop, contract- ors for aqueduct over the Alle- gheny at the mouth of the Kis- keminetas,	57,500 00

Embankment at aqueducts.

Paid contractor for embankment at at Deer creek aqueduct,	400 00
do Sqaw run,	1,340 68

72,311 68

CULVERTS.

Paid contractor on culvert, on sec. No. 12	\$353	20
do do do 23	235	00
do do do 37	190	00
do do do 38	320	00
do do do 48	346	06½
do do do 49	86	35
do do do 91	135	50
do do do 40	49	52
do do do 68	218	65
do do do 69	253	35
do do do 80	70	00

 2,258 13½

WASTE WEIR AND WATER SPOUT.

Paid contractor on waste weir on sec. 89	\$214	23
do Water spout 63	37	00

 \$251 23

PROTECTION WALL.

Paid contractors for wall to protect
Kirkwood's house,

100

BRIDGES.

Paid contractors for materials delivered	\$3,200
do do do 50	
do Embankment on sect. 40	80 10
do do 49	700
do do 59	218 50
do do 68	50
do do 83	205 20
do do 33	52 32½
do do 52	77 92½
do do 67	182 30
do do 23	24
do do 61	48 10
do do 64	120
do do 86	60 17
do do 89	7 81
do do 2	160
do do 29	18
do do 37	154
do do 46	100
do do 77	18
do do 75	290
do do 4	105
do do 17	213 70
do do 38	44 80
do do 48	129 60

 \$6,309 53

ROADS.

Paid contractors on roads on sections
43, 44, 45, and 46,

			\$ 339
do	do	44	21
do	do	69 & 70	100
do	do	68	30
do	do	83	23 36
do	do	17	10

\$ 523 36

On sections from 93 to 113, viz:

Paid contractor on section No.	93	\$303
do do	94	603 37
do do	95	1,109
do do	96	3,421 50
do do	97	3,660
do do	98	2,325
do do	99	1,065
do do	100	1,357
do do	101	1,255
do do	102	1,080
do do	103	540
do do	104	5,400
do do	105	1,037
do do	106	370
do do	107	455
do do	108	2,054 65
do do	109	4,291 37
do do	110	1,695
do do	111	284
do do	112	450
do do	113	320
For protection wall on 104		900

33,975 89

HILL SLIPS.

Paid contractor on hill slip on section 101, 400

LOCKS.

Paid contractor on lock No.	6	3,490
do do	7	4,825
do do	8	4,528
do do	9	3,900
do do	10	5,500
For pier head and protection wall,		4,900

27,143

AQUEDUCTS.

Paid contractors on aqueduct over Pine creek, 3,190

CULVERTS.

Paid contractor on culvert on sec. No. 102	\$680	
do do 104	290	
do do 109	920	
At steam mill on section No. 104,	446	
		<u>\$2,336</u>

DRAINS.

Paid contractor on drain on section No. 95,	255
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TUNNEL.

Paid contractors on tunnel,	7,000
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BRIDGES.

Paid contractor on bridges on sections 98, and 102,	\$150	
do do 104	35	
do do 112	1,846	78
		<u>2,031 78</u>

BRIDGE EMBANKMENTS.

Paid contractor for embankment at bridge on section No. 102	\$81	
do do 107	64	
do do 112	80	
do do 109 }		
And road on said section, }	168	04
		<u>393 04</u>

ROADS.

Paid contractor for road on section No. 99	\$184	
do do do 100	130	
do do do 101	310	
do do 101 & 102	75	
do do do 105	1,350	
do do do 106	75	
		<u>2,124 00</u>

ON THE KISKEMINETAS.

Paid contractor on section No. 1	\$700
do do 2	1,850
do do 3	1,680
do do 4	977
do do 5	1,075
do do 6	5,300
do do 7	3,121
do do 8	2,997
do do 9	1,450
do do 10	587
do do 11	1,359

Paid contractor on section No.	12	\$491	
do	13	685	
do	14	645	
do	15	7,500	
do	16	3,152	
do	17	2,407	
do	18	5,235	
do	19	935	
do	20	710	
do	21	420	
do	22	340	
do	23	625	
do	24	590	
do	25	360	
do	26	560	
do	27	444	
do	28	733	
do	29	635	
do	30	395	
do	31	764	47
do	32	876	19
do	33	1,002	31
do	34	1,289	75
do	35	1,105	
do	36	1,077	04
do	37	324	59½
do	38	383	02
do	39	467	
do	40	452	
do	41	709	48
do	42	222	07
do	43	755	79
do	44	661	
do	45	650	
do	46	796	70
do	47	482	
do	48	920	
do	49	465	
do	50	502	
do	51	260	
do	52	536	76½
do	53	1,145	
do	54	876	
do	55	475	
do	56	322	
do	57	280	
do	58	512	
do	59	1,516	
do	60	724	

Paid contractor on section No.	61	\$1,815	
do	do 62	985	
do	do 63	260	
do	do 64	372	
do	do 65	527	
do	do 66	120	
do	do 67	985	
do	do 68	204	
do	do 69	134	
do	do 70	104	
do	do 71	941	
do	do 72	340	
do	do 73	490	
do	do 74	315	
do	do 75	550	
do	do 76	290	
do	do 77	345	
do	do 78	642 06	
		<hr/>	\$77,927 23 ³ / ₄

LOCKS.

Paid contractors on Lock No. 1.	\$5,280	
do do 2.	3,947	
do do 3.	3,876	
do Guard Lock, 1.	4,680	
do do 2.	4,450	
		<hr/>
		\$22,233

DAMS.

Paid contractors on dam No. 1.	\$12,000	
do do 2.	9,270	
		<hr/>
		\$21,270

EMBANKMENT AT LOCK AND DAM.

Paid contractor for embankment at lock and dam No. 1.	\$280	
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CULVERTS.

Paid contractor on culvert, on section No. 4.	\$150	
do do	13 631 81	
do do	20 220	
do do	28 15	
do do	50 230	
do do	55 175	
do do	57 250	
		<hr/>
		\$1671 81

DRAINS.

Paid contractor on drain on section No.	33 \$67 55	
do do	52 123	
		<hr/>
		\$190 55

PROTECTION WALLS.

Paid contractor on wall, on section No. 17 \$800

do	do	25	100
do	do	27	25
do	do	28	105
do	do	34	480
do	do	35	500
do	do	39	275
do	do	44	220
do	do	62	90
do	do	67	80
do	do	71	260
do	do	74	190
do	do	76	430
do	do	77	30
do	do	78	59 85

 3,644 85

TOW PATH BRIDGES.

Paid contractor on tow-path bridge on section

	No.	29	240
do	do	30	200 70
do	do	32	160 96
do	do	33	280 30 $\frac{3}{4}$
do	do	35	240
do	do	37	30
do	do	42	141 06
do	do	43	176 12 $\frac{1}{2}$
do	do	41	30
do	do	21	30
do	do	46	189 61
do	do	48	85
do	do	63	250
dg	do	70	80
do	do	72	40

 2,173 46 $\frac{1}{4}$

ROAD BRIDGES.

Paid contractor on bridges on sections

	No.	12 and 19	110
do	do	72	20

 130

BRIDGE EMBANKMENTS.

Paid contractor for embankment on bridge on section

	No.	19	\$55
do	do	21	25
do	do	52	35

 115

ROADS.

Paid contractor for road on sects. No. 34 5	\$20
do do 55	76
do do 56	44
do do 65	60
do do 73 4&5	230
do 66, 67, 68, 70, & 71	285
Paid contractor for clearing &c. Hawk's Island,	140

855

FENCES.

Paid Dickson and Kerns, contractors	1,690
J. C. Parry, do	734
J. Crawford do	170

2,594

DAMAGES.

Paid Thomas Speer,	10
Daniel Moyers,	8
Jacob Clark,	20
George Romerly	20
Daniel Moyers	2
Henry Kellet	160
James Bole	17
Jacob Mangold	20
Philip Gable	15
James Scholy	10
James Stewart	10
George M'Clelland	18
Henry Sutzan	5
Barnabas Sweeny	18
John Beatty	10
William Smiley	3
James M'Kee	5
Jacob Streely	8
Robert M'Carke	18
Joseph M'Kissick	15
John Moore	3
Alexander Stewart	14
George Leslie	18
James Blakely	20
James Leslie	20
George Leslie	13
Henry Richebaugh	6 75
Clark & Carson, for removing house on section No. 4	79 37½
John Went	140

Paid John Shellenberger, for removing house on section No. 28	25
Thomas Flickenlooper	20
Brenneman and Fay	300
Peter Duffy, removing fences	8
Stewart Waller & Co. do	8 40
O'Brien & M'Dermott do	8 40
Hugh M'Crea do	4
James Kerling	4
Mathew Diamond	16
Andrew Gallagher	20
Herny Cain	12
James Power	5
James Armstrong	2 50
A. M'Cartney	4
John Brickel	12
Benjamin Hamilton	12
David Jones	5
George Thomas	100
Benjamin Herr	300
James Culling	1
Henry Richebaugh	100
F. Bowers	75
John Gibby, removing house on section No. 103	12
Wilson Crawford	152

 1,912 42½

ENGINEER DEPARTMENT.

Services rendered prior to 7th May, 1827.

Paid N. S. Roberts, personal expenses and salary,	1,621 59
J. D. Harris, assistant engineer, per- sonal expenses and salary,	571 79½
G. S. Rhine, assistant engineer, per- sonal expenses and salary,	477 22½
A. E. Lacock, asst. eng. per diem pay,	394 60
A. D. Harris, do do	479 99
W. B. Foster, jr. rodman, do	281
Emerson M'Ilvaine, do do	177
P. F. Brannan chain carrier per diem pay,	1 50
Thomas Neel, do do	22 12½
S. R. Roberts, do do	4
Charles Divine, axeman, do	54
Charles Sayer, chain carrier and axe- man, per diem pay,	46
Dennis Scully, chain carrier and axe- man, per diem pay,	38
John Kelley, axeman, per diem pay,	281 50

William Sheely, chain carrier and axeman, per diem pay,	93 56
Edward O'Donnel, chain carrier and axemen, per diem pay,	1
Moses Crane, chain carrier and axeman per diem pay,	4
George Freecks, axeman, per diem pay,	4
Joseph M'Connell do do	2
	<hr/> 4,554 88 ³ / ₄

Services, &c. rendered subsequent to 7th May, 1827.

Paid Francis Reno, assis't. eng'r. per diem pay,	\$122
do rodman do	139 50
	<hr/> \$259 50
A. E. Lacock assis't. eng'r. do	316
D. K. Bishop do do	\$220
do rodman do	130
	<hr/> 350
A. D. Harris assis't. eng'r. per diem pay	316
Theos. Williams do do	392
Michael Kennedy do do	187
W. B. Foster, jr do do	392
C. A. Alexander, rodman,	117
James Robeson do do	162
George B. Keen, do do	10 50
E. R. Livermore do do	300
G. R. Eichbaum do do	130 50
James E. Day do do	130 50
James Callan draftsman do	34
John B. Miles rodman do	235 50
Samuel Boreland axeman do	42
Edward Sheely do do	50
John Kelly do do	70
James Crane do do	9
Wm. Hickencoper, do do	79
E. H. Day do do	74
Alexander Fulton do do	73
James G. Brown do do	54
S. M. Porter chainman do	40
James Campbell do do	26
Wm. Hamilton do do	8
A. C. Alexander for surveying roads	60 87
James R. Porter do do	12
	<hr/> 3,930 37

MISCELLANEOUS.

Paid Richard Patton for instruments	\$435
Alonzo Livermore do	134 80
G. G. Wright do	24
Albert E. Bull do	60
H. Hank do	190

For patterns
Tape measures
Axes

40
18
11 25

908 05

CONTINGENT.

Paid R. L. Keen, clerk,	\$194
Postage,	72 06
Office rent, (two offices)	114
For office furniture,	350
For printing,	61 35
For stationary,	147 75

592 66

\$518,144 70 $\frac{3}{4}$

By disbursements by James Clark, Esq. superintendant Juniata division, viz:

Paid contractor on section No.	1	\$727
do do	2	747
do do	4	80
do do	5	564
do do	7	378
do do	8	494
do do	9	361
do do	10	320
do do	11	913 46
do do	12	506
do do	13	30
do do	14	807
do do	15	515
do do	16	741
do do	17	562
do do	18	605
do do	19	718
do do	21	696
do do	22	398 26
do do	23	515
do do	24	461
do do	25	1,596 95
do do	26	752
do do	27	1,289
do do	28	849 59
do do	29	340
do do	30	659
do do	31	713
do do	32	280
do do	33	1,378
do do	34	65
do do	35	574

Paid contractor on section No.	36	279
do do	37	804
do do	38	182
do do	39	500
do do	40	379
do do	41	463
po do	42	1,033
do do	43	354
do do	46	285
do do	47	630
do do	48	319
do do	49	340
do do	50	40
do do	51	91
do do	52	400
do do	53	558
do do	55	318
do do	56	211
do do	57	48
do do	58	1,169
do do	59	232
do do	60	373
do do	61	1,345
do do	62	785
do do	63	216
do do	64	440
do do	65	144
do do	66	140
do do	67	427
do do	68	48
do do	70	161 01
do do	71	76
do do	72	82
do do	74	255
do do	75	26
do do	76	250
do do	77	104
do do	78	307
do do	79	485
do do	80	209
do do	81	198
do do	82	299
do do	83	176
do do	84	162
do do	85	300
do do	90	290
do do	91	353

 35,921 27

ENGINEER DEPARTMENT.

Paid John K. Findlay, asst. engr. per diem pay				274
William H. Morell	do	do		338
Joseph Nilson	do	do	\$182	
do	Rodman	do	117	
				299
A. R. Hetzell	asst. eng.	do	\$132	
do	Rodman	do	106 50	
				238 50
George L. Armstrong	do	do	\$160 50	
Ditto	chainman	do	14	
				174 50
Thomas F. Purcell	asst. eng.	do		260
Wm. B. Mitchell,	surveyor	do	\$52	
Ditto	for cash pd. his hands		18	
				70
Charles E. Miller	rodman	per diem pay		30
William Hunter	do	do		5
John C. Stocker	do	do		67 50
Thomas O'Brien	do	do	\$120	
do	axeman	do	79	
				199
Isaac Gray,	rodman	do	\$207	
do	axeman	do	16	
				223
Edward Watts,	rodman	do		133 50
David L. Scott	ditto	do		37 50
Adam Walters,	chain-carrier	do		3
Jacob Halback	do	do		3
B. B. Reynolds	do	do		34
William North,	axeman	do		137
Henry Leas	do	do		141
Henry Miller	do	do		19
Aquilla Burchfield	do	do		1
William Burgan	do	do		2
David Beidleman	do	do		38
Joseph Shuber	do	do		18
James R. Gilmore	do	do		16
Joseph Powers	do	do		3
Samuel Williams	do	do		1
Robert Branyan	do	do		5
John Conner	do	do		5
William Purcell	do	do		96
William Ross	do	do		80
Thomas Kensloe	do	do		53
Joseph Miller	do	do		64
James Dargon	do	do		9
Robert Wright	do	do		45

Robert Wilson	axeman	62
Jacob Leas	do	33
Edward Hamlin	do	33
James Strawbrige	do	45
John Ramsey	do	13
George Dull	do	24
John Brown	do	5
Jacob Warrina	do	3

 3,333 50

MISCELLANEOUS.

Paid J. M'Allister, & Co. for tape measures	\$13 40
Wm. Davenport, compass and chain	55
Handy Symington and Bird tape measures	9 25
M. Wilson, carriage of instruments	2
Richard Patton, for 2 levelling instruments	290
F. Heisley & Son, for two targets	10 75
Daniel Swisher, for two axes	4 50
Elias Beshore, for four axes	4
John M'Gowan, sundries	44
J. M'Allister & Son, tape measures	15 75
H. Knox, for two axes	2 50
George Espy,	1
Joseph Shuler, repair of target	1 75
William Davenport, levelling instrument	95
S. S. Jones, repairing spiril level	10 06 $\frac{1}{4}$
Sundry persons for wagonage, carrying baggage for engineers, &c. whilst locating canal	126 25

 \$685 21 $\frac{1}{4}$

CONTINGENT.

Paid James Trimble, for state map	\$5
Sol Sprigman, sundry blank books &c.	93
Henry M'Gowan do stationary	34 37 $\frac{1}{2}$
James Taggart do do &c.	22 6 $\frac{3}{4}$
J. M'Gowan do office furniture &c.	42 37
Carey and Lea, stationary	40 47
Oglesby and Pool, shovel and tongs	1
John Elder, stationary	2 50
John Martin, candlesticks	1 50
James R. Boyd, sundries	1 63 $\frac{3}{4}$
Edward Purcell, postage	1 25
Anter and Forster, stationary	175
Elisha Haines, sundries	13 25
J. and J. Milikins, pencils	00 37 $\frac{1}{2}$
For printing, to sundry persons	193

 454 16 $\frac{1}{2}$

 \$40,394 14 $\frac{3}{4}$

By Disbursements by John Philips, Esq. Superintendant on the
French creek feeder, viz :—

Paid contractor on section No.	1	431 94
do do	2	567 13
do do	3	205 39
do do	4	86 40
do do	5	120
do do	6	144 17
do do	7	482 03
do do	8	340 74
do do	9	259 94
do do	10	3 2 49
do do	11	90
do do	12	259 42
do do	13	104 96
do do	14	1 0 48
do do	15	139 14
do do	16	16
do do	17	371 60
do do	18	370 30
do do	19	106 67
do do	20	634 98
do do	21	738 76
do do	22	48
do do	23	392 56
do do	24	196 52
do do	25	259 52
do do	26	335 14
do do	27	762 51
do do	28	228 88
do do	29	108 80
do do	30	190 79
do do	31	95 74
do do	32	627 26
do do	33	540 35
do do	34	381 59
do do	35	104

10,294 50

DAMAGES.

Paid Artemus Smith, for removing a fence	83
John Crosby, for removing a barn	5

3

ENGINEER DEPARTMENT.

Paid John Bennet chain-carrier per diem pay	62½
James Gibson, do do	40½
Richard Patton for levelling instrument	145

146 03

MISCELLANEOUS AND CONTINGENT.

Paid R. L. Potter, office rent	\$8 50	
A. Smith and Co. stationary	75	
Daniel Andrews, postage	8 81 $\frac{1}{4}$	
David Phillips, office furniture	4 50	
For printing, to sundry persons	2 75	
Fuel for office	2 98 $\frac{1}{4}$	
	<hr/>	48 25
		<hr/>
		10,496 58

RECAPITULATION.

By disbursements by Charles Mowry, Esq. acting canal commissioner, on the eastern and Susquehanna divisions,	\$344,585 11
By disbursements by Abner Lacock, Esq. acting canal commissioner, on the western division,	518,144 70 $\frac{3}{4}$
By disbursements by James Clark, Esq. superintendant Juniata division,	40,394 14 $\frac{3}{4}$
By disbursements by John Phillips, Esq. superintendant on the French creek feeder,	10,496 58
	<hr/>
	Dolls. 913,620 54 $\frac{1}{2}$
To balance due the Commonwealth,	259,680 81
	<hr/>
	<hr/>
	\$ 1,173,301 35 $\frac{1}{2}$

No. 234.

Report of the committee of accounts, relative to the accounts of the witnesses examined before the committee appointed to investigate the conduct of Charles Mowry, Esq. canal commissioner.

.....
 READ March 4, 1828.

Mr. Rahn from the committee of accounts, made the following report, which was read, viz:

That they have adjusted the accounts of the following named persons, witnesses examined before the committee appointed to inquire into the official conduct of Charles Mowry, Esq. acting canal commissioner, on the eastern section of the Pennsylvania canal, as follows, to wit:

John M. Allen, four days attendance at	\$1 50	\$6 00
95 miles circular at 10 cts per mile,	9 50	
	<hr/>	\$15 50
John R. Drake, 400 miles circular (omitted in the settlement of his for account) at 10 cts per mile,		40 00

Therefore,

Resolved, That the speaker draw his warrant on the state treasurer, in favor of the above named persons, for the sums set opposite to their names respectively.

No. 235.

Report of the select committee, relative to the official conduct of Robert Porter, Esq. president and judge of the third judicial district.

.....
 READ March 5, 1828.

Mr. Buttz, from the committee to whom were referred sundry petitions, complaining of the official conduct of the Hon. Robert Porter, president judge of the third judicial district, and to whom also was referred an item of unfinished business on the same subject, made the following report, which was read, viz:

That they have had the subject under consideration, and after the most mature deliberation of which the subject is susceptible, in the shape in which it was presented to your committee, they have come to the conclusion, that the charges are not of a nature to require the interposition of the legislature; and therefore, they offer the following resolution:

Resolved, That the committee be discharged from any further consideration of the subject, and that the petitioner have leave to withdraw his petitions and documents.

No. 236.

Report of the committee of accounts, relative to the accounts of witnesses examined by the committee, to whom was recommitted the bill relative to the Harrisburg and Millerstown turnpike road.

.....
 READ March 6, 1828.

Mr. Babt, from the committee of accounts, made the following report, which was read, viz:—

That they have adjusted the accounts of the following named persons, witnesses examined before the committee, to whom was recommitted the bill relative to the Harrisburg and Millerstown turnpike road, as follow, to wit:

Anthony Brand, one day's attendance	\$ 1 50
60 miles circular	6 00

— \$7 50

REPORT

OF THE COMMITTEE ON

Internal Improvement

RELATIVE TO

THE EXTENSION

OF THE

PENNSYLVANIA CANAL,

AND THE

Construction of a Rail Road.

.. ..
READ in the House of Representatives, Feb. 4, 1828.
.....

HARRISBURG:

PRINTED BY S. C. STAMBAUGH.

1828.

THE HISTORY OF THE

REIGN OF KING CHARLES THE FIRST

IN WHICH ARE CONTAINED THE

CAUSES, THE COURSE, AND THE CONSEQUENCES

OF THE CIVIL WARS IN GREAT BRITAIN

FROM THE YEAR 1625 TO 1649

BY SAMUEL JOHNSON

IN TWO VOLUMES

LONDON: Printed by J. B. 1791

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THE HISTORY OF THE

REPORT

OF THE COMMITTEE ON INTERNAL IMPROVEMENT.



Mr. *Lehman*, from the committee on inland navigation and internal improvement, to whom were referred a part of the governor's message, also the report of the canal commissioners and engineers, and sundry petitions relative to rail roads and the extension of the Pennsylvania canal, made

REPORT

That the state by various legislative enactments has recognized, the wisdom of completing a system of internal improvement which will make a fair distribution of benefits among all the great sections of the commonwealth and will combine practicability, economy and state importance

The utility of canal navigation and rail roads, in promoting industry and the free exchange of the products of labor and the mind, is now universally acknowledged. Next to the establishment of schools, adapted to develop mental riches and to give permanence to our free institutions, there is nothing more interesting than the perfection of the means of interior communication. It will consolidate the varied population of Pennsylvania into one great mass, influenced by the same interests and pointing its active energies to the same objects. It will call forth all the resources of the commonwealth, and by furnishing a fund for education will ultimately expand all its moral powers.

The committee will proceed to communicate the result of their anxious enquiries into the best means of completing the works commenced under the auspices of the government, the importance and advantages of which are now so well understood by the people, that no petition has been presented and no voice heard in opposition.

A bill is submitted which proposes to extend the canal from Lewistown to Frankstown, on the Juniata; from Northumberland to Bald Eagle, on the West Branch of the Susquehanna and from Northumberland to the New York state line on the North Branch; from Blairsville to Johnstown on the Conemaugh; from the point where the existing contract terminates on the Delaware to Easton

and from Pittsburg by the Beaver route to the town of Erie, on the lake. It is also proposed that not less than twenty-five nor more than forty-five miles of each section shall be put under contract during the ensuing season. The bill provides for the location of a rail way from Philadelphia through the city of Lancaster to Columbia, thirty miles of which are to be put under contract within the present year. This will accommodate a district of country which from its prolific soil and rich cultivation is regarded as the garden of our country. It is ascertained by the satisfactory report of Major Wilson, to which the committee beg leave to refer, that the rail road is practicable at a moderate expense and it is believed it may hereafter be judiciously extended from Columbia to York and that a wise and equal policy will require its further extension to the west for the purpose of accommodating the populous and flourishing counties on the Southern boundary and connecting them with our own commercial metropolis. The location of a rail way across the Allegheny on the Juniata route, and a contract for the necessary materials is also one of the objects of the bill. The question whether the improvement in contemplation between the Swatara and Columbia or the mouth of the Conestoga, shall be by canal or railway is referred to the decision of the next legislature. It is further provided that scientific examinations shall be made with a view of improving the Monongahela and of connecting the Rays-town branch of the Juniata with the Conemaugh.

In relation to the probable cost of extending the system of internal improvement, the committee have great satisfaction in stating, that the experience of last year, furnishes the aid of facts in corroboration of former estimates. It is indeed true, that from the durable principles on which the sections provided for in the law of eighteen hundred and twenty-six are constructed, from building high and broad walls on account of the size and force of the streams, from the policy of incurring a heavy expense for the purpose of creating water power, from the necessity of erecting an additional aqueduct to accommodate the western emporium, and from the construction of large basins to facilitate trans-shipment and trade; from these and other causes, the cost of the sections first commenced will exceed the sum originally in contemplation.

The commissioners, however, have since the passage of the law of last year, put about one hundred and sixty miles under contract; and from the prices at which the work has been in part completed, and at which the remainder has been contracted for, the estimate for the whole is less than eleven thousand dollars per mile. This includes larger and more expensive dams and aqueducts than will be necessary in the further progress of the work. As respects some part of the work not yet under contract, the committee believe that they may be executed for less than the estimates, which are predicated upon higher prices both for labor and materials than those at which they can now be procured.

The confidence the committee have that the cost of the works hereafter to be executed will not exceed the estimates of the en-

gineers, is confirmed by the experience of our sister states. The executive of New York, in a recent communication of the legislature, says "the Erie and Champlain canals have cost between 20 and 30 thousand dollars a mile, and this enormous expenditure will never occur again. All the mysteries of such operations are developed and all the difficulties diminished, and it may be confidently pronounced that the maximum expense of any given canal will not exceed ten thousand dollars a mile, unless it passes over high mountains, by locks, inclined planes or deep cuttings, or under them by extensive tunnels." The report of the canal commissioners of Ohio to the legislature now in session, says "the final cost of that part of the Ohio canal which has been put under contract, will fall considerably short of the sum at which its cost was originally estimated."

In the bill now submitted it is proposed to appropriate the sum of two millions of dollars.

The committee are aware that among our most prudent citizens there are some who regard with apprehension the temporary increase of the public debt which will be incident to the vigorous prosecution of internal improvement. A public debt is indeed a mortgage upon the estates of the people and when incurred in support of ambitious wars or wasteful luxury, is justly deprecated. The aggregate wealth of the community is believed to be not less than eight hundred millions of dollars. It may be asked whether a temporary incumbrance for the completion of the noblest of works, ought to impede the march of the spirit of improvement? The suggestion of schemes of finance are not within the sphere of this committee, but it may be remarked that the bank stock and other property in the possession of the government, together with the part of the debt due from individuals which will soon be paid, far exceeds the whole of the present debt. The permanent sources of revenue will also constantly increase by the trade which the improvements will nourish and sustain. The money paid by auctioneers in Philadelphia, during the last year, would of itself, be adequate to the payment of the market rate of interest on more than \$3,500,00. The vast amount of shares which the state holds in turnpike, bridge, and canal companies will be rendered productive by the increase of population, commerce and wealth. It is said that the internal navigations of England are three thousand miles in length and that two thousand miles of rail road are completed or in progress towards completion. Notwithstanding these facilities for heavy transportation upon a territory not much greater than Pennsylvania the turnpike roads, which are eighteen thousand miles in length, are enlivened by travellers and light carriages. The tolls which are collected are represented to be nearly a million of pounds sterling. From these facts, the committee confidently predict that the day is not far distant when under the influence of the canal system the turnpikes and bridges of Pennsylvania will become a productive state capital.

In looking for relief from taxation and ultimately of furnishing an ample fund for education and for the extinction of the public

debt, the committee mainly rely upon the productiveness of the canals and rail roads.

In forming estimates of the revenue which will accrue from future canal tolls, our own experience and that of New York. will be safe guides. The Schuylkill mines are not yet in full operation, nor has the Union or the state canal as yet been tributary to the commerce of the Schuylkill navigation. The tolls and water rents of 1827, were, however, \$64,000. Such is public confidence in the work as a profitable concern, that the subscription of \$50,000 of the state to the stock may now be sold above par at the exchange in Philadelphia. The tolls of the New York canals for 1827 were \$859,000 and were supplied chiefly by the traffic of the country on the borders of the canals. The Governor of New York, in his message of last year, says "It is presumed to be a general rule of easy application and execution, that the cost of the repairs and superintendence of a canal ought not to exceed one tenth of its gross income. If we deduct one tenth or \$85,900 from the gross income of 1827 it will leave \$773,100 as the profits. This sum at the market rate, would pay the interest on about seventeen millions of dollars. The New York canals are in length four hundred and twenty-seven miles, and in their whole course meet with no coal and little iron. The Pennsylvania improvements will be of much greater extent and will pass through a country rich with coal and iron and salt and lime and prolific in every thing necessary for clothing or food or habitation. They will reach the western waters, possessing 20,000 miles of boat navigation and they will proceed to intersect the Ohio canal, the practicability of which was ascertained during the last summer by scientific examinations. Profiting by the sagacity of the statesmen who purchased the triangle in the lake, they will extend to Erie, and having an advantage over New York in climate, they will contend for the future commerce of the great inland seas.

In the contemplation of all the facts relative to the tonnage which will pass upon the Pennsylvania improvements, the obvious deductions of reason are, that the tolls which will be gathered upon the Pennsylvania canals and rail road, may before the lapse of many years extinguish the public debt, and instead of a burthen the improvements will prove a rich legacy to future generations.

The committee cannot avoid adverting specially to the resource Pennsylvania has in coal, the most valuable of all articles as tonnage for canals or rail ways. The engineers of the Lehigh coal and navigation company, have made a calculation to shew "that the coal trade, when the population within ten miles of tide are supplied, will pay to Pennsylvania four millions of dollars annually, in the shape of tolls on the improvements, in addition to the profits of the coal dealers and the support of an immense mining and transporting population with their mechanics and families." If this estimate is exaggerated, it is at least countenanced by the fine properties of the Pennsylvania coal, and the varied uses to which it

may be applied. In industry and the arts, in wealth and population, our country cannot long be in the arrear of any nation. It is said there are annually brought into use in Great Britain, twenty millions of tons of coal, and the consumption of London alone, exceeds a million of tons. The West Indies, and perhaps France, will hereafter consume Pennsylvania coal. The market of the United States is open from Maine to New Orleans, and at this time Pennsylvania coal is carried by inland navigation more than one hundred miles to Philadelphia, and thence carried by sea to Richmond, and on account of its superior quality is consumed there within a few miles of the Virginia coal mines.

In conclusion, the committee will remark, that the bill they have framed, is grounded on the principle contained in all the bills relating to a general system of improvement which for many years in succession, were argued in the legislature. This principle was finally adopted in the law of March 27th, 1824, when a new era commenced in Pennsylvania. The law alluded to, as well as the modifications of it made by succeeding legislatures, and under which the present commissioners are acting, directed surveys and examinations of all the great lines of communication which were then deemed practicable, and adapted to unfold the riches of the interior, and afford an easy and cheap communication with the west. It was also a primary object of the legislature, to make our own sea-port the general emporium of trade and commerce. This system, after mature reflection has been commenced by the board of canal commissioners and is sustained by the voice of the people. It is happily adapted to prevent any obstructions from the rivalry of contending interests, and is in accordance with the general interests of the commonwealth. It is demanded alike by justice and expediency and is consonant to the genius of republican government, which looking to equality of taxation, regards with an equal eye the feelings, wishes and interest of the whole community.



REPORT

ON THE

FINANCES OF THE COMMONWEALTH.

.....
 READ in the House of Representatives, Feb. 23, 1823.

Mr. HARRISON, from the committee of ways and means, to whom were referred the several subjects connected with the finances of the commonwealth, made the following

REPORT:

From the annual report of the auditor general, made to the legislature, it appears, that the receipts and payments made at the treasury, during the last fiscal year, ending 30th November, 1827, were,

Total amount of receipts during that time,	\$ 1,588,757 12 $\frac{1}{2}$
To which add balance in the treasury, Dec. 1, 1826,	155,022 05 $\frac{1}{2}$
Making,	<u>1,743,779 18</u>
The payments during the same time were,	<u>1,575,881 30$\frac{1}{4}$</u>
Leaving a balance in the treasury, Dec. 1, 1827, of	<u>167,897 87$\frac{1}{4}$</u>

The committee proceed to show the most important sources of revenue from whence those receipts are derived, with some remarks thereon.

Those derivable from lands during the last year amounted to \$ 73,867 70, and show an increase over the preceding year, of \$ 30,277 20 $\frac{1}{2}$. Those from auction duties during the same time, to \$ 142,928 84—increase, \$ 34,108 78. Those from auction commissions, to \$ 20,900—increase, \$ 200. Those from tavern licenses, to \$ 39,218 15—increase, \$ 4,643 93 $\frac{1}{4}$. Those from tax on bank dividends, to \$ 23,466 34—increase, \$ 194 26. Those from dividends on bank stock, to \$ 76,289 00—shows a decrease of \$ 45,000. Those from retailers of foreign merchandise, also a decrease of \$ 2,052 80. From the remaining sources, some of which being of a permanent and some of a contingent character, there has been but very little variation. Upon the whole, however, after deducting the decrease above mentioned there has been an average gain of about \$ 50,000. First, of the increased receipts on lands, the amount is very considerable, and the anticipations since the passage of the act of 1826, for the collection of those moneys, have been fully realized, and it may be safely estimated to give a continued increase for several succeeding years, should the collections

be persevered in. Any relaxation of the existing laws would produce a contrary result. Second, the receipts from auction duties give a handsome increase, and a similar increase may be expected, unless the proposed modification of the auction laws, by removing the existing duty on the private sales of the auctioneers on commission should have the effect of reducing them. If that measure should be adopted no material reduction is, however, anticipated. Third, the increase on the auctioneers' commission is in amount but small. No reduction thereof is to be apprehended. Fourth, the increase on the receipts from tavern licenses is not very material; but it is to be remarked, that the annual receipt therefrom, maintains its station without much variation, and it is deemed inexpedient to make any change therein. Fifth, the tax on bank dividends gives a small increase and maintains its permanent character. and if change takes place it will most probably be favorable. Sixth, the decrease on the receipts from bank dividends, which have heretofore been the most certain and permanent source, is deficient to a large amount. The causes have already been explained in a report of the committee, made a few days since, and it is of course unnecessary to report them here. The usual dividend has since been made, and therefore may be estimated as in former years. And it is proper here to remark that a portion of the customary receipts, estimated to amount in the current year, to \$101,000, will be subtracted from the ordinary operations of the treasury and passed into the internal improvement fund; and that the premium on the canal loans, which amounted in the last year to \$48,875, (a small part of which, however, was received in the preceding year) will also have to be passed into that fund, which will make a considerable reduction from the total amount of receipts from the ordinary operations of the treasury in the current year; and it will be seen that the above amount of premiums on canal loans, and the \$65,000, part of the loan of \$200,000, being received, constituted the principal part of the balance in the treasury, at the end of the last fiscal year.

The ordinary expenses have, during the last year, increased over the preceding, about \$35,500, on the following items: First, internal improvements, chiefly of a local nature, \$12,631 57—the whole amount of which was about \$67,700. Second, expenses of government, \$19,779 81½—the whole amount of which was \$202,127 24. Third, the militia, \$3,428 70—the whole amount of which was \$26,666 75. Fourth, pensions and gratuities—there has been no increase. The other items of expenditure are chiefly of a temporary and contingent character, and the variation not material.

One considerable item of expenditure last year will not occur in the present, that is, the payment on account of the penitentiaries at Philadelphia and Pittsburg, which amounted to \$54,840 65. The present year it will be but \$3,800. From the increased amount of expenditure the subtraction of a large portion of the ordinary receipts to aid the internal improvement fund and the

receipt of the premiums on loans, belonging to that fund, it will be seen that an increased expenditure at this time cannot be warranted, unless additional aid is applied to the treasury, without seriously embarrassing its ordinary operations.

The unpaid appropriations heretofore made for aiding turnpike companies, roads, rivers, bridges, colleges, &c. amounts to \$213,444 05. The payments from the treasury for those objects amounted in the last year to \$67,735 97½. If no material additions are made at the present or immediately succeeding sessions, the whole amount will have been discharged in less than four years.

Some of the items of expenditure, viz: Expenses of the legislative department of government and of the militia might, without any inconvenience, and with great propriety be reduced.

The committee cannot feel themselves justified in recommending a resort to taxation, or to propose to add any increase on the existing sources of revenue, for defraying the ordinary operations of the government, nor to recommend any further loans for that purpose, nor do they believe it will be necessary, should the views of the committee be sanctioned by the legislature.

The public debt on the 30th of November last, amounted to \$3,353,443 05, comprised as follows:

Due on appropriations made to turnpike companies, clearing obstructions in rivers, bridges and colleges,	\$213,443 05
Due on loans, (exclusive of the canal loan,)	1,840,000 00
Due on the canal loans,	1,300,000 00

Making, \$3,353,443 05

The vested capital of the state consists of	
bank stock,	\$2,108,700 00
Turnpike stock,	1,871,707 92
Bridge stock,	392,955 62
Union canal stock,	45,000 00
Schuykill navigation stock,	50,000 00
Chesapeake and Delaware canal stock, to be transferred to the state, in about ten years from this time,	100,000 00

Amounting to, \$4,568,363 14

It will be proper to remark that the bank stock, owned by the state, is worth at this time a considerable amount above its par value.

The turnpike stock is a very unprofitable stock, yielding but a very small amount of dividend to the state. The turnpike companies are incumbered with debts, some very heavily, and until those debts are discharged, little can be expected from them in the shape of dividends, and it is therefore impossible to estimate its present value.

The bridges have yielded for the last year dividends amounting to \$15,365, being about 4 per cent, and may be expected to improve.

The canal stock above mentioned will, it may be expected, after the expiration of a few years, become a profitable source, the stock being at par in the market.

The amount of moneys due the state for lands cannot, as appears by the report of the secretary of the land office, lately made to this house, be estimated with any degree of certainty, yet from the measures in progress for their collection, and from the increased receipts during the last year, it may be inferred that a very considerable amount will be received from that source, for several succeeding years. The secretary states that from the business now doing in the offices, it may for the current year be safely estimated at \$85,000.

It may not be improper to assume as a data the amount of those moneys due at \$1,840,000, which is equal to the amount of debt created in anticipation of the receipts from that source, and it would appear that the application of those moneys to the payment of that debt would comport with justice and sound policy.

This will appear the more apparent as at this time a large debt is about to be created, and by the payment of the old debt, the state would be relieved from the payment of \$92,000 of interest annually.

This can perhaps only be done by the application of a sinking fund, and should there not be a sufficient sum remaining in the treasury, after the ordinary demands thereon shall have been satisfied, it will become necessary to supply the treasury from new sources, equivalent to the sums to be withdrawn annually and applied to that fund.

However great the resources of the commonwealth may be, it must be admitted that much will depend upon the judicious application and management of them, and this can only be expected from the Legislature, the guardians of the public money. At the creation of a public debt it is no less prudential in governments than in individuals to look to the mode as well as the means for the redemption and ultimate payment. The creation of an efficient sinking fund seems to be called for as no mode has been adopted heretofore for the extinguishment of what may now be denominated the old debt.

The estimated receipts into the treasury during the current year, including the unexpended balance of \$200,000, of the loan of last year and the premium thereon, \$9,500, and the balance in the treasury on the 30th of November last, of \$167,879 $87\frac{3}{4}$ will amount to \$883,397 and the estimated expenses during the same time including the payments to the internal improvement fund and the interest on the old loan, will amount to \$717,444, leaving a probable balance in the treasury of \$165,953, on the first of December 1828.

From the report of the commissioners of the internal improvement fund, made to this house on the 11th instant, it appears that

the receipts and payments made from the 2d of February, 1827, to the 6th of February 1828, inclusive, were:

Amount received from the state treasurer, for the construction of the Pennsylvania canal	\$1,140,000 00
Amount paid to the treasurer of the board of canal commissioners,	1,140,000 00

The receipts into the fund, from the several sources pledged thereto, were in the last year,	84,778 48
To which add the balance in the fund, Feb. 1st, 1827,	30,107 15

Making,	\$ 64,885 63
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There was paid during the same time, the interest on the canal loan of 1826 and 1827, \$2,401 39

To engineers, and secretary of the canal commissioners, 5,625 00

Balance in the fund, 6th February, 1828, 26,859 24

64,885 63

The probable receipts and payments are estimated by the commissioners from Feb. 1, 1828, to Feb. 1829, as follows.

From auction duties, \$80,000,00

Dividends on turnpike and bridge stock, 17,000,00

Collateral inheritances, 3,500,00

Escheats, 500,00

To which add balance in the fund, 6th Feb. 1828, 26,859,24

\$127,859,24

And the payments during the same time of the interest on loans heretofore made and proposed to be made at the present session are estimated to amount to, \$115,000,00

Leaving a probable balance in the fund on the 1st February, 1829, after paying the interest on loans due that day,

12,859,24

\$127,859,24

By a clause in the act of the 16th April last, the engineers and secretary of the board of canal commissioners were to be paid out of the internal improvement fund, and in as much as it appears that this fund was originally designed for the payment of the interest of loans for the construction of the Pennsylvania canal, and ultimately for the redemption of the principal of such loans, and it therefore becomes necessary to replace that amount with any future payments in the fund, and to cause the payment thereof to be made out of funds placed at the disposal of the board of canal commissioners.

The balance of the fund will accordingly be augmented to \$18,484,24.

And the commissioners observe, that they do not believe that the commonwealth would derive any advantages at present from an increase of the internal improvement fund, from sources other than those already appropriated by law:

Should there be a surplus by the existing law, that surplus would have to be vested in United States or other productive stock. Judging from loans heretofore made by the commonwealth, the commissioners do not suppose that they could invest money in such stocks yielding five per cent. per annum without giving a premium of between four and five per cent.

Should there be a surplus in the treasury during the current year, they recommend that it might be advantageously applied to the payment of the loan authorized under the act of 1826, a part of which (\$75,000) is reimbursable at the pleasure of the state.

The committee concur in these views, because it is evident that if a considerable surplus is suffered to remain in the funds, which could not with advantage be invested, there would be a loss of the interest, and that it would be the better course to apply such sums as may from time to time be found necessary to meet the interest on loans made and to be made, and it may very naturally be supposed, that until the canals are so far completed as to yield tolls and incomes over and above such interest, until such surplus is created, no investment can be made to advantage.

From the foregoing report it appears that the internal improvement fund is in a favorable state, that it will meet all demands upon it for the current year, and leave a balance of upwards of \$18,000. The estimated interest on the loans for the same time are predicated on a loan of \$2,000,000, and it is the opinion of the commissioners that it will be unnecessary to increase the fund so as to produce an accumulation, and it would appear that the pledged sources, some of which are of an increasing nature, and the premium on loans, that will accrue in the current year, and the amount already due the fund on that account, will probably amount to \$100,000 to be invested therein, so as to meet the interest in 1829, which may be estimated as sufficient for that purpose.

It may be expected that in the following year (1830) receipts from tolls will be had from that portion of canals now in a state of forwardness, and it can then be judged what aid, if any, it may be necessary to apply to strengthen the fund.

It is therefore deemed unnecessary for the committee to recommend any measures at this time for raising means to aid the operations of that fund, and that reliance may be placed upon the productiveness of the canals and improvements contemplated to pay the interest and ultimately to reimburse the debt that may be created in their construction, which expectation is justified by experience in similar undertakings in our country.

The committee on inland navigation and internal improvement, have accompanied their late report to this house with a bill which provides for the further extension of the Pennsylvania canal, and for the location of a rail way from Philadelphia through Lancas-

ter to Columbia, thirty miles of which to be put under contract within the present year, and also the location of a rail way across the Allegheny on the Juniata route, and appropriating for these objects \$2,000,000.

The means to commence and to prosecute the great system of internal improvement in which the commonwealth is now engaged, have been by loans, which were obtained on very favorable terms, and it may be said the time has been auspicious, as there has been much redundant capital unemployed seeking investment, and the stock of the state possesses a character that gives it a preference over most others, and should this favorable state of the money market continue, it may be presumed that future loans may be obtained on equally if not more favorable terms.

Under these circumstances the committee think it the most advisable course to pursue, having the sanction of experience of a sister state as a guide.

With ample resources, and under auspices so favorable, results the most valuable and interesting to our commonwealth may be fairly anticipated.

ANNUAL REPORT

OF THE

PRESIDENT AND MANAGERS

OF

**THE UNION CANAL COMPANY
OF PENNSYLVANIA,**

TO

THE STOCKHOLDERS.

November 20, 1827.

PHILADELPHIA:

PRINTED BY LYDIA R. BAILEY,

NO. 10, NORTH ALLEY.

1827.

AT the Annual Meeting of the Stockholders of the Union Canal Company of Pennsylvania, held at their Office, No. 6 Carpenter's Court, on the 20th of November, 1827, the following Report was presented, read, and accepted; and is now printed in pursuance of the provisions of the Charter.

At the same Meeting, the following Gentlemen were chosen to conduct the affairs of the Company, for the ensuing year.

PRESIDENT.

SAMUEL MIFFLIN.

MANAGERS.

WILLIAM LEHMAN,
GEORGE VAUX,
WILLIAM BOYD,
WILLIAM READ,
CHARLES GRAFF,
JOHN C. STOCKER,

WILLIAM W. FISHER,
JACOB GRATZ,
FRANCIS G. SMITH,
PETER HAHN,
WILLIAM Y. BIRCH,
SAMUEL BAIRD, *of Reading.*

REPORT.

IN obedience to the injunction of the Charter, the BOARD OF THE UNION CANAL COMPANY now make their annual statement—

It is with great satisfaction they can say, that the Union Canal, which is to form the great link of communication between the Susquehanna and Philadelphia, is now complete in all its parts, with the exception of the planking on the summit, which will be finished in ten or fifteen days.

Notwithstanding difficulties and embarrassments, which in the internal navigation of the United States are unprecedented, the Board believe that the Union Canal presents a work of improvement, which, for economy of expenditure, for beauty, solidity, and adaptation to its purpose, will be found unequalled in our country.

The Board will refrain at the present time from a minuteness of detail, as from former reports, when the parts of the work were incomplete, a correct opinion may be formed of what has been done in relation to locks, dams, aqueducts, tunnelling, embankments, towing paths, bridges, waste weirs, culverts, and excavation. It may moreover be said, that the picturesque country through which the Canal flows; the judgment with which it is laid out; the taste and style of beauty with which it is constructed, and the rational curiosity which

is felt to see a work so intimately connected with the prosperity of our state and its fine metropolis, have attracted many of the Stockholders to the place of its location, where all the parts have been personally inspected.

The Board will proceed to explain the reasons why it was impracticable to open an extensive trade during the past season, and why they now confidently predict the benefit of an uninterrupted navigation during the ensuing year, and thus accomplishing the most important step towards developing the riches of Pennsylvania, and giving to Philadelphia the advantages of her geographical position in relation to the interior of our state, and of the western country generally, a position which will make her the commercial capital of that country.

Early in the last summer, the whole Canal was considered in a state of completion, and preparations were making to fill the entire line with water, when unfortunately, after the passage of the first boat, the steam-engine pump, which had been constructed in Pittsburg, was broken, and the summit was found less retentive of water than had been anticipated. These unavoidable accidents (against the recurrence of which effectual measures have been taken,) have been the prime cause of the unexpected delay which has taken place.

The steam-engine, as well as the great water wheel with the pumps, are now in perfect order, and, before the opening of the spring, a second water wheel, and a second steam-engine, will be in readiness, for the purpose of rendering more certain, at all times, an abundant supply of water.

The Board, taking into consideration the limestone soil, through which the summit is constructed, and the immense advantage which will result from preventing all

filtration or soakage, have, with the advice of Canvass White, Esq. their engineer, (as will be seen by his report hereto annexed,) nearly completed the planking of the sides and bottom of the entire summit, and it is believed that the water may be admitted before the close of the season. Every other part of the Canal, including the navigable feeder, is now filled with water to the extent of about eighty miles, and used for the transportation of coal, lumber, and other commodities.

As it is hoped the State Canal will, before the close of the year, be navigable from Middletown to Harrisburg, efforts will be made to pass a boat through the whole extent of the Union Canal to Middletown, and from thence through the State Canal to Harrisburg, so as to exhibit a Union Canal boat at the seat of government, and thus remove the prejudices which now exist in the minds of some, against the size and capacity of the boats.

In relation to what are usually denominated the narrow boats of the Union Canal, the Board will remark, that the science and experience of the world are now enlisted on the side of narrow boats, as adapted to carry an adequate quantity with greater facility and economy than large boats. Upon the Union Canal, ten men and ten boys, with ten boats and ten horses, will carry and bring back 250 tons, with less labour and in less time, than can be done with boats which are usually denominated "wide boats," whatever may be their size. The boats which are constructed for the use of the Union Canal, and which for some time have been used upon the eastern and western sections, are found, by actual experience, to be able to carry at least 25 tons, and to be easily drawn by one horse, and passed through each lock in five or six minutes.

The New-York Canal Commissioners, in their official report to the Legislature, say, that by constructing two sets of locks, they can pass 1,900,000 tons annually, and with single locks one half that quantity. Now let us suppose that the locks of the Union Canal will pass 8 boats an hour, of 25 tons each, or one every $7\frac{1}{2}$ minutes; then it follows that 200 tons will pass every hour, or 4800 tons in 24 hours. If then the Canal is navigable but 250 days a year, 1,200,000 tons may be passed in a single year.

It will be competent, as has been heretofore stated, to enlarge the capacity of the Canal, by raising the banks and locks one foot, and boats of 40 tons each may then navigate the Canal with facility, or 1,920,000 tons may pass in a single year. The whole commerce of all the branches of the Susquehanna has been estimated at 200,000 tons, and the Pennsylvania Canal Commissioners say, in their report to the last legislature, that the total of the commerce which passes the mouth of the Juniata by water, from the north and west, of a kind to be carried on a Canal in preference to the river, is 125,000 tons.

From the foregoing facts, the Board and the public must be brought to the irresistible conclusion, that although a liberal policy requires that no objection should be made to the accommodation of other districts of country, either with rail roads or Canals, the Union Canal will, for many years to come, have the capacity of conveying to market the whole produce of all the branches of the Susquehanna.

The Treasurer's account, showing the sum of \$31702 16 cents to be the balance of cash in his hands on the 1st inst. is herewith submitted, and the further sum of \$5000 will be received in a few days, as the last instal-

ment due from the commonwealth, which will complete the whole amount subscribed under the act of 1821, by the state and by individuals.

In conclusion, the Board will remark, that the Union Canal Company are engaged in the construction of a work which, in times that are gone by, from difficulties, financial and physical, failed in the hands of David Rittenhouse, Robert Morris, and other master spirits of Pennsylvania. Under the protecting and helping hand of the legislature, it is now on the eve of accomplishment. The unavoidable difficulties, and which may be chiefly ascribable to the nature of the soil, have never disheartened the Board, and they have been sustained and animated by a correspondent feeling on the part of the Stockholders, who have at all times, when called upon, freely paid their respective instalments. If any new and now unforeseen difficulties present themselves, every resource of labour and art must be called forth to overcome them. The Union Canal is the hope of Philadelphia, and so far as the commercial greatness and the ample revenue Philadelphia affords the state, is a matter of concern, it is the hope of Pennsylvania. Nature, by limiting the number of springs and streams of water, has fixed limits to which Canals can be carried from the Susquehanna to the commercial capital of our state, and it is believed that no other direct water communication can ever be made. Every faculty must therefore be employed to sustain and preserve the Union Canal; and when the greatest and most useful enterprise the New World has yet witnessed, and in which the commonwealth is now engaged—when the Pennsylvania Canal shall have reached the shores of the Ohio and the Lakes,

the richest results to the Stockholders, and to the public at large, will be fully enjoyed.

All which is respectfully submitted.

By order of the Board of Managers.

SAMUEL MIFFLIN, *President.*

Philadelphia, November 20, 1827.

DR.

Union Canal Company in account with Thomas P. Roberts, Treasurer.

CR.

		Dolls.	Cts.			Dolls.	Cts.
1826.	To cash paid by order of the Board of Managers, from November 1, 1826, to February 1, 1827, - - - -	118,705	14	1826.	By balance, as per settlement of the Committee of Accounts, November 1, 1826, - - - - -	10,934	29
1827.	To cash paid by order of ditto ditto, from February 1, to May 1, - -	119,344	54		By cash received, from November 1, 1826, to February 1, 1827, - -	112,749	99
	To cash paid by order of ditto ditto, from February 1, to May 1, - -	107,037	72	1827.	By cash received, from February 1, 1827, to May 1, - - - -	115,672	40
	To cash paid by order of ditto ditto, from May 1, to August 1, - - -	178,910	91		By cash received, from May 1, to August 1, - - - -	194,771	46
	To cash paid by order of ditto ditto, from August 1, to November 1, 1827, -				By cash received, from August 1, to November 1, 1827. - - - -	121,572	33
	Balance - - - - -	31,702	16			555,700	47
		555,700	47		By balance, November 1, - - -	31,702	16

Philadelphia, Nov. 1, 1827.

E. E.

THOMAS P. ROBERTS, Treasurer.

Examined, compared with the entries, and found correct, showing a balance in the hands of the Treasurer, of thirty-one thousand seven hundred and two dollars, sixteen cents, on the first inst.

Nov. 19, 1827.

WILLIAM BOYD, } Committee of Accounts.
JACOB GRATZ, }

Extract of a Letter from Canvass White, Esq. Engineer of the Union Canal Company of Pennsylvania, dated July 7, 1827.

“ Having taken into consideration the present state of the summit level of the Union Canal, I would earnestly recommend to the Board of Managers, the immediate adoption of a plan, that will effectually guard against the evil so seriously felt, in consequence of the great loss of water, occasioned by absorption and leakage. Several plans have been considered, such as puddling, &c. but the one which I should recommend, as being the most economical and effectual in its operation, is to cover the bottom and sides of the Canal with plank or boards, well jointed and secured to bed pieces of timber, laid transversely in the Canal, with land ties and braces, &c. and giving to the sides an angle of at least 45 degrees. In addition to the saving of water, this plan will guard against another difficulty, which has been encountered, and is yet much to be dreaded; that is, the treacherous nature of the soil overlaying the lime rock, which abounds on the summit to a greater extent than was anticipated; and we find by experience that there is no safety in removing the earth and rock, and puddling, even to the depth of two feet. Although the sinks can be stopped without any great difficulty, at the time of their first occurrence, yet they will occasion considerable delay in the navigation, and loss of water in order to make the necessary repairs.

“ It may be asked, why were not these difficulties sooner noticed, or a remedy earlier recommended? I would observe, that the difficulties could be ascertained only by the actual experiment of letting in the water, and this could not be done until after the feeders were completed;

and further, it was advisable to avoid the expense if possible.

“I think there can be no doubt, as to the propriety of the measure, and that the interest of the company will be essentially promoted, by making a thorough job as above recommended, which will effectually settle the question, as to the stability of the summit-level, and a permanent supply of water, of which there can be no doubt—and secure public confidence in the work, which will be absolutely necessary, in order to divert the trade from the Susquehanna.”

REPORT

OF THE

COMMITTEE OF WAYS AND MEANS

RELATIVE TO THE

UNION CANAL LOTTERY,

AND TO PREVENT THE

SALE OF FOREIGN LOTTERY TICKETS,

MR. HARRISON, CHAIRMAN.

HARRISBURG:

PRINTED BY S. C. STAMBARUGH,

1828.

REPORT

OF THE

COMMITTEE OF WAYS AND MEANS.

.....
Read in the House of Representatives, Feb. 9, 1823.
.....

The committee on ways and means to whom were referred a resolution instructing the committee to inquire into the expediency of repealing the several acts of assembly, which authorise the Union canal company to raise by way of lottery a certain sum of money, and also into the expediency of making further provision for preventing the sale of foreign lottery tickets within this commonwealth,

REPORT:

That with a view to a full investigation of the subjects of inquiry embraced in the aforesaid resolution, and in order to afford the Union canal company and Messrs. Yeats & M'Intyre, the managers of the lotteries connected therewith, an opportunity to be heard in matter that so materially interested them, the committee named a day for a hearing and gave them notice accordingly. At which time James C. Biddle, Esq. of Philadelphia, appeared on behalf of the Union canal company and of Messrs. Yeats & M'Intyre, before the committee, and stated very fully the objections of the said Union canal company and the said Yeats & M'Intyre, to the repeal of the laws authorising the said company to raise money by way of lottery, which they alledge would operate unjustly on the parties concerned, viz: The stockholders of the old and new stock, the holders of the loan and the lottery managers.

In order to a correct understanding of the subjects, it will be necessary to refer to the several acts of assembly relating to the lottery grants.

By the act of the 17th April, 1795, the president and managers of the Schuylkill and Susquehanna navigation and the president and managers of the Delaware and Schuylkill canal navigation, were authorised to raise by way of lottery, a sum of \$400,000 for the purpose of completing the works in their acts of incorporation mentioned, under a prohibition, that neither of them should form the

same into capital stock, upon which to declare a dividend of profits. And by the act of fourth March, 1807, the said companies were authorised to raise their respective sums separately, subject to the like prohibition as to dividends thereupon, but the same to be considered as a bounty to said corporations, to enable them to make the tolls as low as possible.

The two companies by the act of second April, 1811, were consolidated and incorporated by the name of the Union Canal Company of Pennsylvania; and were authorised on such terms and conditions as they might think fit, to raise by way of loan, such sums of money as they may find expedient, for the completion of the canal upon the credits of the capital stock, including the neat proceeds and avails of the lotteries thereby authorised, and to mortgage any part or the whole of their property, tolls, profits or estates whatsoever. And by the 28th section of the same act, authority was given to said company to raise the residue of the original sum equal to \$340,000, by lottery and to sell and assign the right to raise the said residue or any part thereof, and that such assignments shall vest for the term they shall so acquire, with the same rights and privileges as the said corporation and the profits arising from said lotteries, shall not form capital stock upon which dividends shall be made but shall be considered as a bounty to enable them to make the tolls as low as possible.

By the 3d section of the act of 29th March, 1819, the avails and neat proceeds of lottery granted by the 28th section of the act of 1811, were pledged as a fund for the payment of an annual interest of six per cent, upon sums subscribed under this act. The shares not forfeited in the old companies were placed on the same footing.

By the 8th section of the same act all right and title to any and every kind of property which belonged to the late Delaware and Schuylkill, and Schuylkill and Susquehanna canal companies which is now held or may hereafter be acquired by the said Union canal company, by lottery or otherwise, shall be held in common by the old and new subscribers, and the said property was thereby vested in the two classes of stockholders, and a full and entire participation in every advantage to be derived therefrom.

And by the 9th section of the same act, whenever the avails or neat proceeds of the lottery shall exceed the amount of the sum required by said act to pay the interest as is directed by the 3d section, such excess shall go into the capital stock and to be invested, if not wanted to complete the works in the United States or other safe funds, and it was made lawful to make dividends on the interest arising therefrom.

The act of 1821, guarantees interest on 2,500 shares, amounting to 450,000 dollars for 25 years, if the proceeds of the lottery granted to the Union canal company, and tolls shall not yield a sum sufficient and in order to avoid as far as possible all disability to pay such interest, so much of the 3d section of the act of 1819 as pledges any part of the avails or neat proceeds of the lottery afore-

said to the payment of interest to the holders of old shares, is thereby suspended until the canal shall be completed and the said company are authorised to continue during the said term of 25 years to raise by way of lottery any sums that may be wanted for the purpose of paying to the holders of the said stock the six per cent. aforesaid. Provided, that whenever the neat proceeds of the tolls shall amount to said six per cent, the privilege thereby granted of raising money by lottery shall during such time be suspended, except so far as is authorised by existing laws, and it shall in no event be lawful to divide any sum arising from said lottery over and above six per cent. upon the stock of said company, it being the intent and meaning of the act that all such excess shall be reserved to meet any deficiency thereof that may at any time occur in the tolls as aforesaid. If any payment of interest be made by the commonwealth equivalent to a share or shares the commonwealth should be entitled to a certificate of stock therefor.

The guarantee of interest to cease if the navigation be not completed in ten years after interest shall first accrue.

From the foregoing extracts of the several acts of assembly, it appears that the lottery grants were given in the first instance, to the two companies and afterwards continued to the Union canal company, to aid and encourage the construction and completion of a canal and lock navigation, uniting the waters of the Susquehanna and Schuylkill, and that in consequence of those grants, individuals were induced to invest their funds in the furtherance of the work, and loans to the amount of \$830,400 were made under the authority given by the act of 2d April, 1811, upon the credit of the capital stock, including the neat proceeds and avails of lotteries and property tolls, and profits of the company, which stands pledged therefor, and that a resumption of the lottery grants or a repeal of the laws authorising them would materially interfere with vested rights and operate unjustly upon three distinct classes of persons having vested rights in said company, viz: the stockholders of the old and new stock, the holders of the loan, and the managers of the lottery. The committee will not enlarge upon the nature and extent of the injury that these description of persons might be subjected to, nor will they say to what extent it would impair confidence in the faith of the legislative enactments, and to the injury of the character of the commonwealth.

The act of 1811, (28th sect.) authorises the company to sell and assign the right to raise money, by way of lottery, and vests the right of the company in the assignee, during the continuance of the contract. In pursuance of the authority thus granted the company, entered into a written contract, dated the 6th of October, 1824, with Archibald M'Intyre, by which the right to raise money, by way of lottery in Pennsylvania, was transferred to the said Archibald M'Intyre, for the sum of \$150,000, \$64,000 of which remains to be raised, in order to complete the contract, which will expire on the 31st of December, 1829, when the whole amount authorized to be raised by lottery will have been completed, such being the ac-

tual situation of the case, a resumption of the lottery grants, cannot at this time be made without an infringement of the constitutional provision in relation to contracts.

Messrs Yates and M'Intyre, the present lottery managers, are citizens of another state, and nothing is alleged, or appears against their conduct, in the management of that concern, but on the contrary, it appears that they have acted fairly and honorably in the fulfilment of their engagements, neither has it appeared that the stockholders, nor the president and managers have done any thing to require the interposition of the legislature; and the committee think it but justice to say, that the president and managers of the Union canal company, have performed their duty with fidelity the great work committed to their charge has been brought to a completion and their labours bid fair to be crowned with merited success. It is a work in which the commonwealth at large have a deep interest, and as a stockholder to the amount of \$50,000. It is now confidently believed that the canal will be brought into operation early in the next spring, and it may be fairly presumed, that the receipt of tolls will yield a profit sufficient to pay the interest on the whole cost of the work, and that the succeeding year will probably give an increased amount of profits over and above the interest.

And a confident hope may be indulged, that at the expiration of the lottery contract with Messrs Yates and M'Intyre, the company will be enabled, and it may be presumed they will be perfectly willing, to relinquish altogether the lottery privileges granted them.

If this reasonable expectation should not be acceded to on their part, it would then be a proper time for the legislature to take such measures to put an end to the lottery grants to said company, as might be consistent with justice, propriety and expediency.

By the latter clause of the resolution, the committee were instructed to propose some further provision to prevent the sale of foreign lottery tickets within this commonwealth.

There are several acts of assembly in force for the suppressing and preventing lotteries, one of a date so early as the year 1762, and by the act incorporating the Union canal company, passed the second day of April, 1811, it is provided that any person or persons who shall sell or expose to sale, or shall advertise or cause to be advertised for sale any lottery tickets, not authorised by the laws of this commonwealth, and shall be aiding and assisting, or in any wise concerned in the sale of such tickets, or in the managing, conducting or carrying on any lottery or device in the nature of a lottery not authorised as aforesaid, such person or persons on conviction, shall forfeit and pay a fine at the discretion of the court, not exceeding \$2,000, to the president and treasurer of the Union canal company, to be by them applied to the sinking fund.

Notwithstanding the prohibition and penalties imposed by existing laws, the practice of selling foreign lottery tickets, notoriously prevails to a great extent, and it may be presumed, that whilst the lottery privileges granted to the Union canal company exists,

it will be difficult to suppress effectually the sale of foreign lottery tickets in this state, as it must be evident that facilities are thereby afforded to evade the laws, superadded by the temptation to do so.

The evil tendency of lotteries are very much to be deprecated, and a desire is very prevalent to eradicate them, and the period of the expiration of the contract between the lottery managers and the Union canal company, may be confidently looked to, when the legislature will interpose their authority in such a manner as will ensure a total suppression of them.

Whether it is owing to the inadequacy of the existing laws, or from reluctance in the citizens to appear in the character of informers, or whatever may be the cause, it is not easy to determine, but it may be inferred, that severe penalties would, under existing circumstances be alike unavailing.

The committee, from these causes are constrained to recommend the adoption of measures that would tend to restrain and lessen existing evils, by permitting persons of fair character, under security and payment of a sum of money to the commonwealth therefor, to sell lottery tickets, the permission only to extend to the sale of tickets in lotteries authorised by the laws of this state and for one year only, and prohibiting under suitable penalties, hawking and peddling lottery tickets of every description.

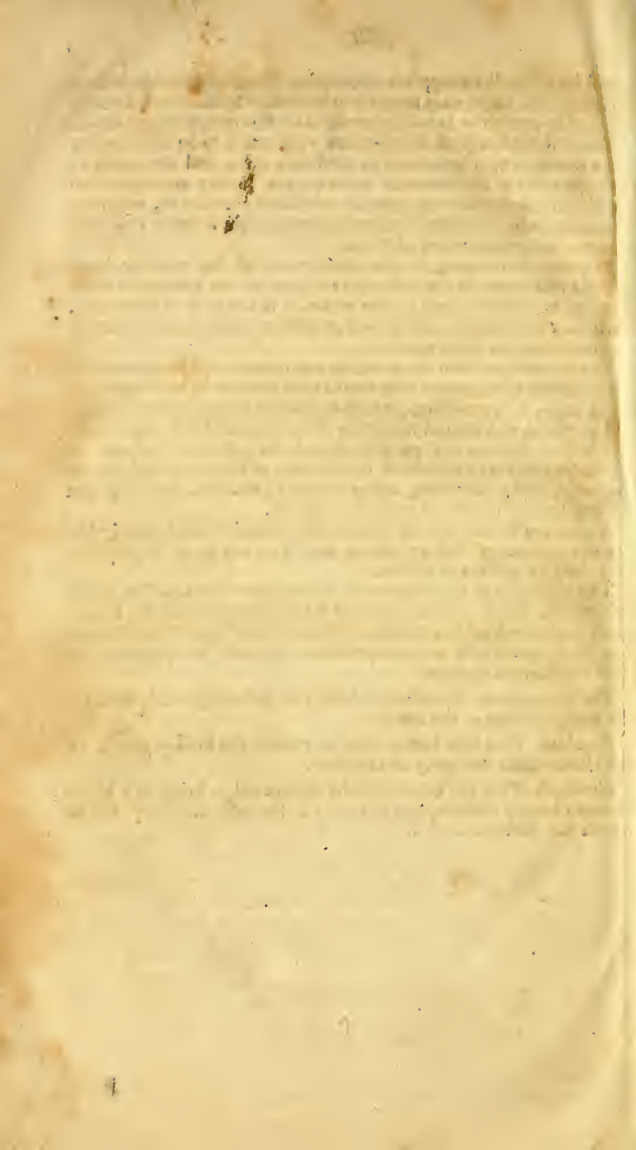
A measure of this description it is presumed, would greatly lessen the number of lottery offices, and prevent gross impositions practised by pedlars of tickets.

The objection to this measure is that it gives the sanction of law to lotteries, but it may be observed that the sanction of the law already exists and must continue to exist at least until 31st December, 1829, when it is to be hoped measures will be taken for the total eradication of them.

The committee, therefore, submit the following resolutions for the consideration of the house.

Resolved, That it is inexpedient to resume the lottery grants to the Union canal company at this time.

Resolved, That the committee be instructed to bring in a bill to regulate lottery brokers, and to restrain the sale of lottery tickets within this commonwealth.











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